



## Lough Bracken Enhancement Feasibility Study and Landscape Master Plan



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## 1 Introduction

Flynn, Furney Environmental Consultants have been commissioned by Meath Partnership to carry out a detailed feasibility study for potential enhancement works for Lough Bracken in north County Meath. Lough Bracken is an important site which fulfils roles as a public amenity, drinking water resource and as a place for recreation. In addition to this it is of significance as a habitat for a range of wild species.

The aim of this study is to identify the current condition of key environmental and amenity aspects of the site including the condition of the banks, the lake's fringe and walking trails. The study also looks at the condition of habitats occurring here and assesses the pressures upon these areas and how they are in turn impacting the lake as an amenity and as a water source.

The baseline data collected was used to assess the necessary restorative and infrastructural works that may be required in order to improve the lake's water quality, ecosystem health and amenity functionality. This data was then used in the formation of a Landscape Masterplan for the site. A wide range of possible amenity activities suited to the site and its surroundings were explored and have been presented as part of the Landscape Masterplan. These include improvement works to existing site infrastructure, creation of new amenity features and the exploration of other actions for Lough Bracken and the surrounding area.

### 1.1 Study area

Lough Bracken is located 2km southwest of the village of Drumconrath in north Co. Meath. The nearest major town is Ardee 8km to the west and Dundalk and Drogheda are both approximately 25km away northwest and southwest respectively. Lough Bracken serves as the water source of

the town of Drumconrath, with an abstraction point, pumping station and treatment plant located on the southern shore of the lake.

The landscape is dominated by rolling hills interspersed with streams, hedgerows and small ponds and lakes. The dominant land-use in the area is pasture-based agriculture with some arable also present. Conifer plantations interspersed with small areas of native woodland are also common locally. The study area and surroundings can be seen in Figure 1.

The soils on the site are generally of fine loamy drift with limestones. No exposed rock was recorded around the site. The lake sits within a deep basin at the base of a steep hill that rises to 109m (Above Ordnance Datum) to the north of the lake. The lough covers approximately 7.2ha and is considered a Marl or limestone lake owing to its calcareous surrounding and substrate. Marl lakes are base rich (calcareous) and nutrient poor and are usually characterised by clear water, deposits of calcium phosphate (marl) and Charophytes (calcicole algae).

The lough is surrounded by a number of other semi-natural habitats that form part of the lake's amenity area. As such, these are also important features for this study. The western portion of the lake shore is surrounded by a small fringe of deciduous woodland vegetation that grades into conifer plantation varying in ages from 10 – 25 years old. An access road for the lake's water treatment plant and pumping station runs adjacent to the lake, approximately 60 metres from the shoreline. Further west of this roadway is more Coillte-owned conifer plantation, including an excellent mature stand of Scots Pine. The lake's eastern shore was previously bounded by a small area of scrub which has since been removed. This cleared area now grades into pasture and wet grassland. The southern edge is again bounded by pasture lands that climb steeply from the lake shore to a hilltop approximately 40 metres above the lake shoreline. The fringes of the lake are surrounded by reeds, rushes and areas of marsh. Several portions of these areas have become highly degraded. These will be discussed in further detail below.

## **2 Survey Scope and Methodology**

This study aims to gather information that will allow a full description of the current conditions at Lough Bracken in terms of the amenities, water quality statues, ecological condition and habitat quality. The baseline assessment is then used to inform a number of plans, innovations and

initiates for the enhancement of the site's recreation amenities including fishing, swimming, bird watching and walking. This will then allow for the creation of a Landscape Masterplan for the recreational and biological restoration of Lough Bracken. This Masterplan also aims to enhance the site's biodiversity and overall habitat quality. This will in turn improve water quality, aiding water treatment for Drumconrath water supply, promote healthy fish stocks and improve conditions for anglers and swimmers.

## **2.1 Ecological Assessment**

A baseline ecological and biodiversity assessment of the whole site and some of the surroundings was carried out. Distinct habitat areas and specific ecological features of interest were recorded. An assessment of habitat quality and function was also determined, along with the main threats to these habitat areas and their overall impact upon biodiversity at the lake.

## **2.2 Technical study of lake shore condition and water quality analysis**

A conditions survey was undertaken to assess the current status of the lake's shoreline. Undercutting, erosion and subsidence has led to serious alterations to bankside vegetation and losses of soil to the water body. This large release of sediments and nutrients is likely to impact upon fish communities and also the nature of vegetation assemblages along the shore line. The following ecological surveys / analysis were conducted:

- Habitat surveying and mapping to determine the distribution, extent and condition of habitats around the lake shore. This habitat assessment follows Fossit (2000) which is the standard methodology for habitat assessment in Ireland.
- Macroinvertebrates of the lakeshore vegetation were sampled by sweep-netting the vegetation of the lake fringe. Sampling was carried out with a Freshwater Biological Association-approved hand held sweep net with a mesh diameter of 500µm. Samples were sorted and preserved in alcohol for laboratory analysis. The results and interpretation can be seen in Section 2.8
- Data analysis of the physiochemical parameters tested by Meath County Council and Irish Water as part of the continual monitoring of Drumconrath water supply.

- A macrophyte survey of lakeshore vegetation was carried out. This was conducted from the bank, wading in the littoral zone. Specimens were collected and analysed for identification. Locations and relative abundance of macrophytes was recorded. This survey also sought to determine the presence of any invasive aquatic plant species, such as curly leaved pondweed. The results of this survey were used to inform management strategies required for management of bankside and aquatic vegetation.

### **2.3 Consultation with communities and user groups**

Local community groups, landowners and all other stakeholders associated with the lake and surrounds were consulted as part of this assessment by way of survey. These discussions investigated the history of the lake, usage patterns, land use changes along the shoreline and historical fisheries information.

The proposed future uses for the site were outlined to stakeholders and feedback was sought for desired changes to the current amenities at the lake. Input and opinions from stakeholders and from user groups was encouraged. Conflicting and aligning aspirations and reservations of stakeholders were considered. The results of this survey may be seen in Section 2.11.

## **3 Baseline Site Condition**

### **3.1 Habitats**

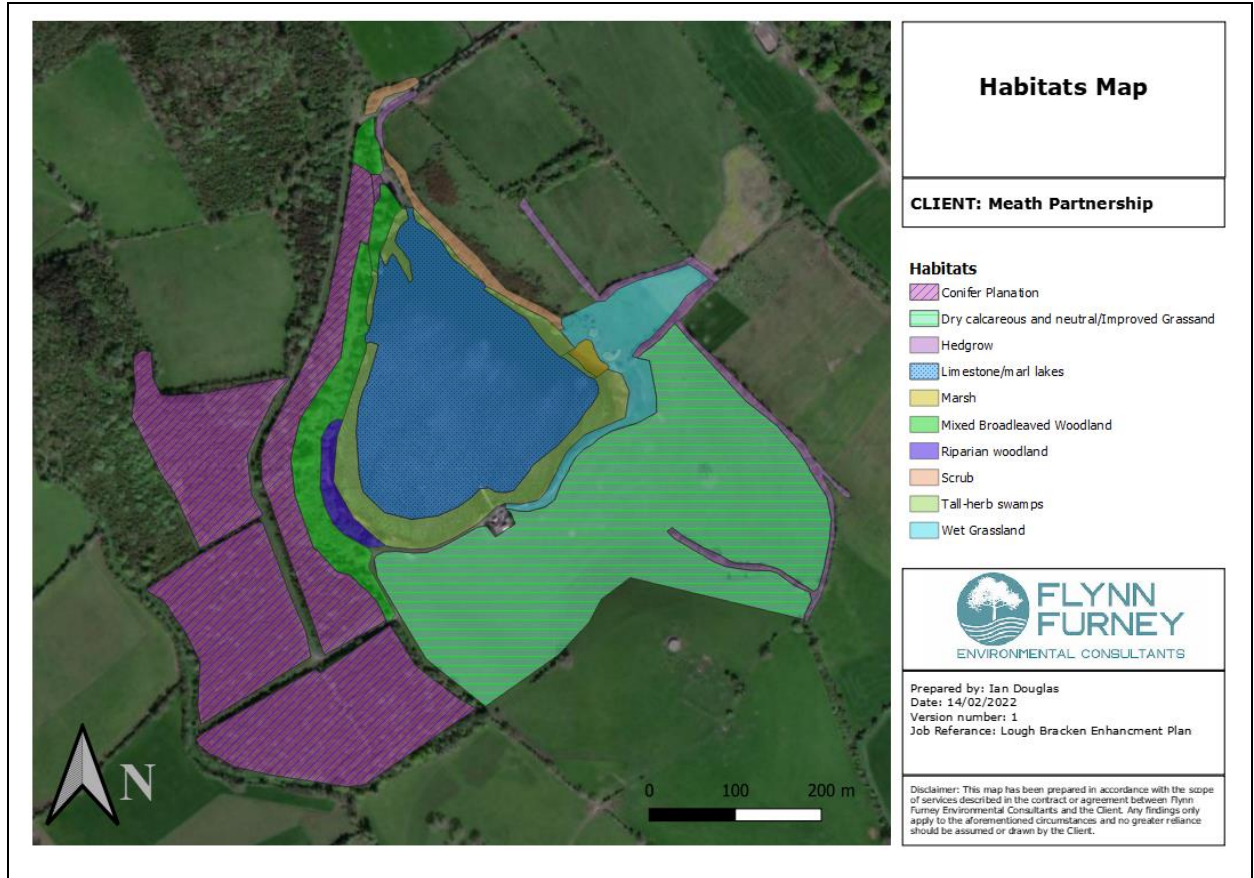
A broad scale habitat map can be seen in figure 1. The following habitats were recorded around the lake and its fringes. This assessment also gives an indication of habitat quality and if this is likely to impact upon water.

#### **3.1.1 Limestone/marl lakes**

Lough Bracken is considered a marl lake as it is base-rich and poor to moderately rich in nutrients (oligotrophic to mesotrophic). Its waters are naturally clear and the lake sediment usually has a high proportion of marl, a white clayey precipitate of calcium carbonate. Stoneworts (*Chara spp.*) are often abundant in Marl lakes but none were recorded during this survey. Disturbance leading to reduced water quality is likely impacting Lough Brackens ability to display natural

characteristics of a Marl Lake The lake is fringed by a number of other aquatic habitats. These discussed below.

**Figure 1: Habitats Map**



### 3.1.2 Reed Fringe

Much of the lake is surrounded by a reed fringe composed of stands of herbaceous vegetation that is dominated by reeds and other large grasses and sedges. Most of the lake fringe was dominated by Common Reed (*Phragmites australis*) with occasional Reed Canary-grass (*Phalaris arundinacea*). Smaller and lower-growing herb species included Yellow Iris (*Iris pseudacorus*) and Water Horsetail (*Equisetum fluviatile*). A detailed assessment of the reed fringe is presented in section 3.3.

This habitat type is critically important to the function and overall health of the lake for the following reasons:

- It protects bankside soils against erosion
- Creates a buffer zone between the aquatic zone and the terrestrial zone
- Works as a riparian buffer slowing down, attenuating and capturing sediments and nutrient rich surface water run off before it enters the lake.
- Bacteria living around the roots of reeds digest organic matter and recycle nutrients, limiting the risk of nutrification in the water body.

Much of the reed bed habitat surrounding the lake has become highly degraded as a result of cattle having access to the water's edge. This has meant the capacity of the reed fringe to complete these functions has been diminished.

**Figure 2: Poaching and degradation of the reed fringe**



### **3.1.3 The Marsh**

A small marsh area was recorded where a minor water course flows out of the lough. This area is likely seasonally waterlogged depending on water levels within the lake or subject to infiltration from the surrounding landscape. This marsh was dominated by Reeds (*Juncus Spp.*), small sedges (*Carex Spp*), Yellow Iris (*Iris pseudacorus*) and Water Forget-me-nots (*Myosotis scorpioides*).



Marshy areas like the reed fringes discussed above provide opportunities to slow down the flow of water through the landscape and act as regulators of water entering and exiting the lake due to fluctuations in their own water levels. Marshes also carry out a similar range of ecosystem functions as discussed in section 3.1.2.

#### **3.1.4 Wet grassland**

Wet grassland is a transitional habitat, in this instance acting as a buffer between improved grassland and the reed fringe. Species included Reeds (*Juncus Spp.*), small sedges (*Carex Spp.*), Water Forget-me-nots (*Myosotis scorpioides*). Grasses included Yorkshire-fog (*Holcus lanatus*) and Creeping Bent (*Agrostis stolonifera*). Herb species included Creeping Buttercup (*Ranunculus repens*), Marsh Thistle (*Cirsium palustre*), Silverweed (*Potentilla anserina*), Meadowsweet (*Filipendula ulmaria*) and Water Mint (*Mentha aquatica*). This habitat area was found as a thin band running along the southernmost edge of the lake with a larger area of wet grassland at the lake's south eastern corner. This habitat was also heavily poached by cattle.

#### **3.1.5 Hedgerows and Scrub**

Much of the eastern extent of the lough was surrounded by dense hedgerows and scrub but this was mostly removed during the winter of 2020/21. If the remainder is left and managed, this area will become scrub again, but sadly this may take a number of years to recover. This transitional habitat type develops on steeply sloping banks that fall down towards the water's edge. The canopy layer consisted mainly of Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Ash (*Fraxinus excelsior*), Willow (*Salix Spp.*), Yews (*Taxus baccata*) and Bramble (*Rubus fruticosus agg.*) with Gorse (*Ulex europaeus*), Holly (*Ilex aquifolium*), Honeysuckle (*Lonicera periclymenum*), Hedge Bindweed (*Calystegia sepium*), and Bush Vetch (*Vicia sepium*) also common. The understory contained Willow Herb (*Chamaenerion angustifolium*), Ivy (*Hedera helix*), Bracken (*Pteridium aquilinum*), Herb-Robert (*Geranium robertianum*) and Nettle (*Urtica dioica*). This habitat formed a dense thicket and shrouded much of the walkway along the eastern extent before it was removed. Scrub, particularly on sloping areas, is important as it acts as a buffer, slowing down any runoff from the neighbouring farmland.

#### **3.1.6 Grassy Verge**

A small area of amenity grassland or grassy verge was recorded beside the car park. This area is strimmed occasionally by locals but is otherwise unmanaged. This was dominated by grasses like

Yorkshire-fog (*Holcus lanatus*), Smooth Meadow-grass (*Poa pratensis*) and Cock's-foot grass (*Dactylis glomerata*). The dominant annual flowers included Hogweed (*Heracleum sphondylium*), Dandelion (*Taraxacum spp.*) Nettle (*Urtica dioica*), Creeping Buttercup (*Ranunculus repens*), Wood Dock (*Rumex sanguineus*) and Fat hen (*Chenopodium album*). The area has also been planted with trees including Beech (*Fagus sylvatica*), Horse Chestnut (*Aesculus hippocastanum*) and Oak (*Quercus petraea*).

This area is a rubbish blackspot. Black plastic bags full of rubbish along with individual pieces of rubbish were noted in this area at all site visits. Some of this rubbish is likely to end up in the lough.

### **3.1.7 Conifer Plantation**

Much of the western edge of the lake is dominated by conifer plantations composed mostly of Sitka Spruce (*Picea sitchensis*). Around the edges of the plantation broadleaved trees are present including Birches (*Betula spp.*), Hazel (*Corylus avellana*), Willows (*Salix spp.*), Oak (*Quercus spp*) and Ash (*Fraxinus excelsior*), Elder (*Sambucus nigra*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) were also noted. The understory was limited due to a lack of light penetration with Ivy (*Hedera helix*) and Bracken (*Pteridium aquilinum*) occasionally. A plantation of Scots Pine (*Pinus sylvestris*) was recorded west of the pump station access road. This is an excellent semi-natural habitat area with mature Scots pine up to 20 metres high and a highly developed understory including Hazel (*Corylus avellana*), Ash (*Fraxinus excelsior*), Elder (*Sambucus nigra*) and Hawthorn (*Crataegus monogyna*).

**Figure 3: Stand of Scots Pine**



Conifer plantations close to the water have historically caused significant impacts to water quality within the lough. Drains were created during planting, flowing towards the lough. This major release of sediments led to significant water quality issues including blue-green algal outbreaks. It is not believed that these trees are now having as significant an impact on water quality as in the recent past. However the acidic nature of pine needles and soil under pine trees is likely to have at least localised impacts to the inherently alkaline waters of the lough.

### **3.1.8 Riparian Woodland**

Riparian woodlands are wet woodlands on rivers or lakes subject to frequent flooding, or where water levels fluctuate. Excellent riparian woodland was recorded around the lough's south western shoreline. This is dominated by stands of Willows including Grey Willow (*Salix cinerea*) and occasional Alders (*Alnus glutinosa*). The field layer is characterised by broadleaved herbs such as Nettle (*Urtica dioica*), Creeping Buttercup (*Ranunculus repens*), Meadowsweet (*Filipendula ulmaria*), Wild Angelica (*Angelica sylvestris*), Hemlock Water-dropwort (*Oenanthe crocata*) and Hedge Bindweed (*Calystegia sepium*). Stands of Reed Canary-grass (*Phalaris arundinacea*) were identified around the fringes of this woodland. Dead vegetation and dead wood were common throughout this area. This area is one of the most ecologically significant portions of the lakeshore habitat and should be protected.

### 3.1.9 Mixed broadleaved Woodland

This habitat type occurs mainly in a thin band along the lakes western shoreline between areas of reed fringe and riparian woodland to the east and conifer plantation further to the west. Other small pockets of this habitat type are found around the site entrance and near the car park. These woodlands were over 75% covered in broadleaved trees with the remainder composed of conifers from the adjacent plantations. Beech (*Fagus sylvatica*) was a common within the southern portion of this habitat type along with Willows (*Salix Spp.*), Alder (*Alnus glutinosa*), Downy Birch (*Betula pubescens*), Sycamore (*Acer pseudoplatanus*), Elder (*Sambucus nigra*), Ash (*Fraxinus excelsior*) and occasionally Hazel (*Corylus avellanacrab*). The ground layer within this habitat type was variable and often contained large numbers of sapling Elder (*Sambucus nigra*) and Sycamore (*Acer pseudoplatanus*). Bramble (*Rubus fruticosus agg.*) was dominant or abundant in most areas along Wood Speedwell (*Veronica montana*), Ivy (*Hedera helix*), Herb-Robert (*Geranium robertianum*), Wood Sorrel (*Oxalis acetosella*) and Bracken (*Pteridium aquilinum*). In clearings or closer to the water's edge Rosebay Willowherb (*Epilobium angustifolium*) and Nettle (*Urtica dioica*) were recorded. Along the woodland path Early Dog-violet (*Viola reichenbachiana*), Enchanter's-nightshade (*Circaea lutetiana*) and Wood Avens (*Geum urbanum*) were recorded.

### 3.1.10 Dry calcareous and neutral grassland/Improved Grassland

Grasslands around the lake's southern shoreline rise steeply away from the lake to a high of approximately 40 metres above the waters level. This grassland does not look to have been improved through reseeding or fertiliser in recent years on sloping areas. Were the field is flatter, slurry or fertiliser looks to have been applied. Grass species included Perennial Rye-grass (*Lolium Spp*), Meadow Foxtail (*Alopecurus pratensis*), Timothy (*Phleum pratense*), Sweet Vernal-grass (*Anthoxanthum odoratum*), Crested Dog's-tail (*Cynosurus cristatus*) and Yorkshire-fog (*Holcus lanatus*). Due to grazing pressure herbs were limited, but included Clovers (*Trifolium spp.*), Yarrow (*Achillea millefolium*), Common Selfheal (*Prunella vulgaris*), Docks (*Rumex spp.*) and Creeping Buttercup (*Ranunculus repens*).

This habitat area in itself is unlikely to be impacting the lake's water or habitat quality. However the cattle that graze this area have unrestricted access to the lake's waters and are responsible for the majority of the poaching along the lake's southern shoreline. In addition if slurry or fertiliser was applied to this field given the steepness of the slope runoff would be likely to occur.

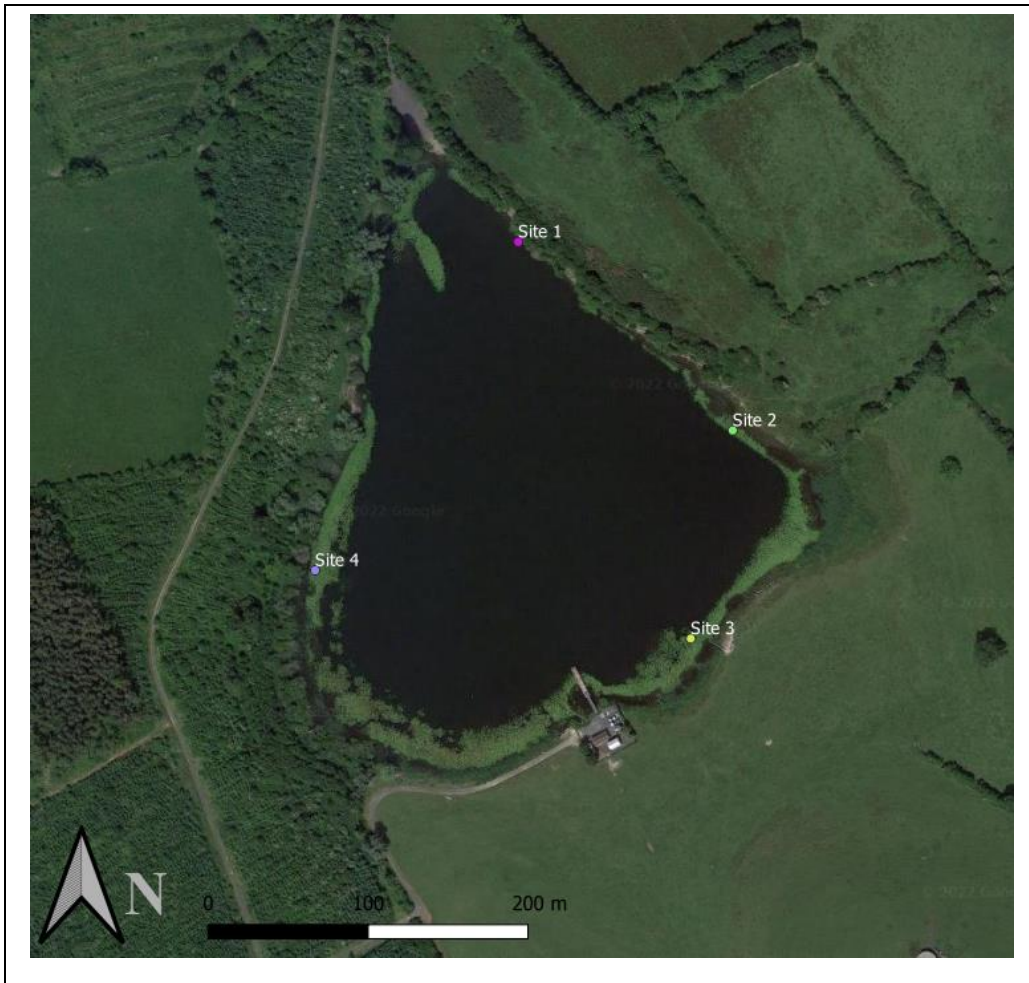
## 3.2 Reed Fringe Assessment

An assessment of the vegetation assemblages of the lake reed fringe was undertaken on 17<sup>th</sup> June 2021. The purpose of this was to assess:

- the species makeup of the reed fringe
- the extent of the fringe
- any damage or other pressures on this habitat type

Four locations were chosen for a detailed survey. These were chosen in order to provide a representative sample of the main shoreline vegetation communities. Areas that were devoid of plants (e.g. at angling pegs or where the lake is otherwise accessed) were not sampled. The location of sample sites is shown in Figure 4.

**Figure 4: Reed fringe and Macroinvertebrate sample sites**



**Site 1.** This site has a substantial fringe made up almost entirely of Black Bog Rush (*Schoenus nigricans*). The fringe extends for around 3.5m. There is a single Willow (*Salix cinerea*) of around 2m in height. There is also a fringe of Water Lily (*Nuphar lutea*) at the furthest extent of the Rush. The ground flora here is rather poor with Water Mint (*Mentha aquatica*) being among the few vascular plants here and the only one that is water dependent.

**Site 2.** A very substantial fringe of vegetation occurs at this point. A total fringe extent of 15m was recorded here. Here, Soft Rush (*Juncus effusus*) occurs on tussocks that have been formed through the action of cattle poaching. This extends over an area of greater than 2.2m. Silverweed (*Potentilla anserina*) also occurs here. 1m out from the track Silverweed is occasional, giving way to occasional Water Horsetail (*Equisetum fluviatile*) and then an area of bare ground. Moving toward the lake, Brooklime (*Veronica beccabunga*) is abundant and Water Mint frequent. Common Reed (*Phragmites australis*) is initially dominant on the wetted area for around 3m. It

becomes frequent along with Black Bog Rush, which then becomes dominant in the deeper water with Common Reed being occasional.

**Site 3.** A shallower but more diverse reed fringe was recorded at this point where again there was evidence of poaching (more significant than at Site 2). The extent of the reed fringe here was around 9m. On the edge of the liminal zone ruderal plants were abundant. These were Docks (*Rumex spp.*), Perennial Rye-grass (*Lolium Spp*), Creeping Buttercup (*Ranunculus repens*) and Hairy Bitter-cress (*Cardamine hirsuta*). Plants of somewhat wetter areas here were Watercress (*Nasturtium officinale*) and Cuckoo Flower (*Cardamine pratensis*). 1m from the bank, diversity was greatest with Branched Bur-reed (*Sparganium erectum*), Water Mint and Watercress, all occasional. There was also Water Horsetail, Marsh cinquefoil (*Comarum palustre*) and Water Dock (*Rumex hydrolapathum*). For approximately 2m toward deeper water, Yellow Flag Iris (*Iris pseudacorus*) was dominant. Finally, a fringe of 5m in extent was dominated by Black Bog Rush with a fringe of Yellow Water Lily at its edge.

**Site 4.** This site is located on the southwestern shore of the lake with a substantial fringe of Willow defining the shore area. Including the substantial fringe of Yellow Water Lily, the total extent of the fringe here is 23m. Soft ground at the edge of the wetted area has Alder (*Alnus glutinosa*) with frequent Meadowsweet (*Filipendula ulmaria*) and Hairy Bitter-cress, with Iris being rare. For an extent of 4m, Reed Canary Grass (*Phalaris arundinacea*) and Water Mint are frequent with Hedge Bindweed and Meadowsweet occasional. For 2m, Reed Canary Grass is abundant with Iris occurring occasionally, along with Water Mint. The final 5m of the main fringe is made up of rather dense Willow with Reed Canary Grass, Water Horsetail and a pondweed (*Potamogeton spp.*). Finally, Yellow Water Lily extends for a further 10m from the fringe.

The reed fringe at site 1 was smallest in extent and also the least floristically diverse. This would likely be a function of the amount of available substrate here. Evidence of cattle poaching was seen at both Sites 2 and 3, the latter being more severe. Despite this, plant diversity was greatest here. This would be related to the gentle slope and suitable substrate available. There was no evidence of poaching at Site 4 with livestock being prevented from entering this area. There was some evidence of anthropogenic disturbance at site 4 (discarded materials), likely from angling activity. However, this was not very significant. The reed fringe generally shows good structure on much of the lakeshore. The suitability of the substrate would indicate that if the

grazing/poaching pressure is removed, regeneration of this habitat type in the affected areas would be readily achieved.

### 3.3 Water Quality at Lough Bracken

#### 3.3.1 EPA Catchments 3rd Cycle Report

In the 'EPA Catchments: 3rd Cycle Draft Newry, Fane, Glyde & Dee Catchment Report, 2021', Lough Bracken (referred to as 'Brackan') is listed as having 'Agriculture' as its significant pressure. The issues related to farming in this catchment are predominantly due to phosphorus loss from pastures to surface waters, for example, direct discharges, or runoff from yards, roadways or other compacted surfaces, or runoff from poorly draining soils. The report states that "one lake waterbody (Brackan) is confirmed to be affected by eutrophication". The report also acknowledges that sediment can also be a problem for surrounding waterbodies from land drainage works, bank erosion from animal access or stream crossings. A significant proportion of the catchment is underlain by poorly draining soils and subsoils, and there are significant areas of high pollution impact potential for phosphate to surface water.

**Figure 1: Lough Bracken and tributary, River Dee\_050. Source: catchments.ie**



Abstraction for Drumconrath public water supply was identified as a significant pressure on Lough Bracken waterbody, with altered habitat due to hydrological changes identified as the issue. The lake is classed as being 'At Risk' and of 'Moderate' status, with the significant pressures listed as



'Agriculture' and 'Other'. The term 'Other' in the 2021 EPA Catchment report covers impacts such as acidification, saline intrusion, elevated temperature, litter, microbiological pollution and unknown impacts. The lake is recommended as an 'Area for Action' due to the recurrence of Trihalomethanes (THMs). According to Irish Water, the Water Treatment Plant (WTP) at Lough Bracken struggles with poor raw water quality and the presence of algal growth in the lake results in THMs.

THMs are chemicals which may be found in water treated with chlorine. Trihalomethanes (THMs) may be formed as a result of adding chlorine to water containing high levels of organic material (e.g. vegetation such as algae). The concentration of THMs in drinking water varies according to the level of organic material in the water, the amount of chlorine required to treat the water, and the temperature of the water that is being treated. Some water supplies have reported levels of THMs which are higher than the recommended levels. Irish Water is developing a National THM plan in order to deal with this issue. According to the HSE, temporary exposure to THMs is apparently quite harmless, however long-term exposure has the potential to cause serious health issues such as cancer or reproductive effects. It is stressed that the evidence for this is inconclusive, however. The legal limit of total THMs in drinking water in Europe is 100 µg (microgrammes) per litre. People can check the levels of THMS and other substances in their local water supply by entering their address at the Water Quality page on the Irish Water website.

### **3.3.2 Irish Water Boil Water Notices**

On checking the above mentioned Irish Water webpage for the Drumconrath area during this study, it appears there is a 'Boil Water Notice' in place for its water supply, which comes from Lough Bracken. In September 2016, September 2021 and on three occasions in 2015, THMs exceeded the limit – in March, July and September. In September 2017 and 2019 there were also exceedances of Fluoride.

Regarding Bacteria, in 2020 and 2015 there were exceedances in the colony count. Colony Count is a test for naturally occurring environmental bacteria found in soil, air and water. There is no specified limit for Colony Count in drinking water, however an abnormal increase in the Colony Count test may potentially indicate a more serious problem in the water supply. An exceedance of Colony Count suggests an inadequate disinfection system. It may also indicate that there is not enough residual chlorine to deal with the number of bacteria in the water.

A search for Lough Bracken online brings up a video post on Twitter from 14th November 2021 showing a substantial amount of what looks to be blue-green algae along the shoreline. The post mentions that a boil water notice had only just been lifted a month before. Irish Water responded to the message and requested the person who posted the video contact them directly.

### 3.3.2 EPA Subcatchment Report

The EPA’s WFD Cycle 2 Dee\_SC\_020 Subcatchment report from 2018 states that all three water bodies in the subcatchment are ‘At Risk’ due to less than Good ecological status. Elevated ammonia concentrations are an issue within the Dee\_060, while elevated phosphate and ammonia are issues within Dee\_070 and Lough Bracken (including chlorophyll). The report adds that throughout the subcatchment, agricultural activities (e.g. landspreading, farm yards) have been identified as a significant pressure impacting nutrient conditions, in addition to channelisation, as this activity may impact physical habitat conditions (especially excessive fine sediment). Wastewater treatment is also an issue impacting the Dee\_070. The report describes Lough Bracken as a ‘small drinking water lake, with an abstraction, and suffers from eutrophication with steep slopes down to the lake’. It stresses that further investigation is needed ‘to determine what is driving the lake status’. The following table shows the water bodies in the Dee\_020 subcatchment (including Lough Bracken) and each of their main pressures.

**Table 2: Table showing main pressures in the subcatchment. Source: EPA Cycle 2 report for Dee\_SC\_020, 2018.**

Code	Name	WFD Risk	Pressure Category	Pressure Sub Category
IE_NB_06_209	Brackan	At risk	Agriculture	Agriculture
IE_NB_06_209	Brackan	At risk	Abstractions	Water supply
IE_NB_06D010600	DEE_050	At risk	Agriculture	Farmyards
IE_NB_06D010600	DEE_050	At risk	Hydromorphology	Channelisation
IE_NB_06D010670	DEE_060	At risk	Agriculture	Agriculture
IE_NB_06D010670	DEE_060	At risk	Hydromorphology	Channelisation
IE_NB_06D010670	DEE_060	At risk	Urban Waste Water	Agglomeration PE of 500 to 1,000
IE_NB_G_018	Ardee	Review	Anthropogenic Pressures	Unknown
IEGBNI_NB_G_019	Louth	Review	Anthropogenic Pressures	Unknown

### 3.3.3 Meath County Council Water Quality Data

According to water quality results provided by Meath County Council, Lough Bracken is sampled four times per year, between the months of April and November. Measurements for approx. 26

parameters are taken each time at the lake, at the Water Treatment Plant jetty. Results are currently available for between the years 2011 and 2021. While results could not be provided for 2016 from Meath County Council, they are available to view on the catchments.ie website. A number of key parameters were looked at for the purposes of this report, which are Phosphorus, Nitrates, Nitrites, Ammonia, Chlorophyll and Dissolved Oxygen.

### **Phosphorus (P)**

On studying the data available for Phosphorus from 2011 to 2021, Lough Bracken shows mostly eutrophic to hypertrophic tendencies. The lowest Phosphorus measurement recorded was 0.016 mg/l in April 2017, while the highest was recorded at 0.207 mg/l in July 2012. While the lake has been close to exceeding the set Phosphorous limit of 0.22mg/l on one or two occasions, it has consistently stayed within the set limit. For a lake to be considered 'Good status' it needs to consistently score a mean of less than/equal to 0.025 mg/l for Phosphorus.

### **Nitrates and Nitrites**

Based on the same dataset, Nitrates ( $\text{NO}_3$ ) have stayed well within the limit of 11.3mg/l for the last decade. The acceptable limit for Nitrite ( $\text{NO}_2$ ) is 0.5 mg/l and the levels have also stayed within this from 2011 to 2021.

### **Ammonia ( $\text{NH}_3$ )**

The acceptable standard for Ammonia is 0.2mg/l. This figure was exceeded once in May 2015 at 0.48 mg/l, following on from just being at the limit of 0.2mg/l in April 2015. The figure was also quite high and nearing the limit in August 2015, reaching 0.194 mg/l. There are a substantial number of gaps in the data recorded, which makes it difficult to be conclusive on the overall view for Ammonia; however in most cases for the data available for the last decade, it seems to have stayed within the acceptable standard limit.

### **Chlorophyll**

While there are no mandatory standards for chlorophyll concentrations in water, nor are there references to the parameter in the various EU Directives relating to water quality, there is a trophic classification scheme. The Organisation for Economic Cooperation and Development [OECD] proposed this scheme in 1982 for lake waters which has been adopted (with modifications) in Ireland by the EPA, and it forms the basis for the reporting of quality status in

lakes. The results for Lough Bracken range between 4.6 mg/m<sup>3</sup> (or equivalent µg/l) to a high of 75 mg/m<sup>3</sup>. The table below indicates the trophic levels of a lake based on Chlorophyll. If we take the mean figure of Lough Bracken to be 18.55 mg/m<sup>3</sup>, the lake would generally be classed as 'Mesotrophic', however on several occasions in the last decade it could be classed at varying levels of 'Eutrophic', and at one point in October 2016, verging on 'Hypertrophic'.

**Table 3: Trophic categories for Lake water. Table: EPA**

LAKE CLASSIFICATION SCHEME	
<i>Trophic category of Lake water</i>	<i>Annual Maximum Chlorophyll mg/m<sup>3</sup></i>
Oligotrophic [O]	< 8
Mesotrophic [M]	8 - 25
Eutrophic - Moderately [m-E]	25 - 35
Eutrophic - Strongly [s-E]	35 - 55
Eutrophic-Highly [h-E]	55 - 75
Hypertrophic [H]	> 75

### **Dissolved Oxygen**

Dissolved Oxygen (DO) levels indicate the health of the lake and whether fish and other aquatic life can survive well within it. It can be measured in both % saturation and mg/l. Oxygen levels are inversely proportional to temperature, so the higher the temperature, in general the lower the oxygen level will be. As temperature records are not provided along with the oxygen level data available, it is difficult to declare how 'healthy' the lake is in terms of DO. In several instances in the past decade, the saturation point has exceeded 100%. While an excess of DO is not a problem in itself, it indicates that the daytime conditions may be mirrored by an equally large undersaturation of oxygen at night-time, when photosynthesis ceases and plant respiration takes over, leading to more oxygen consumption. This usually indicates there is high algal growth (eutrophication) and there is a risk that when DO levels fall very low, it will lead to asphyxiation of fish and thus, fish kill events.

### **3.3.4 Discussion on Water Quality**

From the desk research undertaken for Lough Bracken, its water quality was found to be 'Moderate' and considered 'At Risk', notably from phosphate enrichment, eutrophication and water abstraction for the village of Drumconrath. The ongoing issue of nutrient enrichment is contributing to the reduction in ecological status, with other notable effects such as spikes in

Trihalomethanes, Fluoride and Colony Count, meaning that Boil Notices are sometimes put into effect by Irish Water in the locality. The primary pressure on the lake is likely coming from agricultural runoff, which is exacerbated by the poorly draining soils of the area. Sedimentation from land drainage and bank erosion from livestock access are also issues identified.

A number of targeted approaches are needed to address the issues identified. These might include the creation of vegetative buffer zones around the lake perimeter; fencing, with the provision of alternative water sources for livestock; more efficient use of fertilisers and pesticides and employing more ecologically friendly land drainage practices. Other issues such as abstraction rates may need to be considered, along with septic tank checks for one-off housing in the area, for instance. If the lake is designated as an Area for Action under the upcoming 3rd River Basin Management Plan Cycle (2022-2027), there is a good chance that more focus will be given to addressing the key water quality issues identified for Lough Bracken.

### **3.4 Macroinvertebrate Sampling**

Samples of aquatic macroinvertebrates (non-microscopic water-dwelling invertebrates) were taken at 4 no. sample sites. These sites are concurrent with those of the reed fringe assessment as detailed in Section 3.2. The sites were chosen in order to be representative of the different vegetation communities occurring at Lough Bracken.

A total of 46 no. macroinvertebrates could be identified from the 4 sample sites. Nine different Taxa (groups) were found within these samples. The results of the sample analysis are given in Appendix 2.

The results showed a reasonably diverse range of groups. Hemiptera (the 'true bugs') were well represented with 4 no. different genera of same found. Four of the taxa are very tolerant of poor water quality. These include Water Hoglice and Mosquito. However, these were not found in excessive numbers or even in great abundance. Conversely, two genera of Cased Caddis Fly were found. These are moderately sensitive to poor water quality. The remainder are moderately tolerant to poor water quality.

Site 3 had the greatest diversity of taxa and had also the greatest number of macroinvertebrates recorded. Sites 2 & 4 were of approximately equal diversity and macroinvertebrate numbers. However, most of the invertebrates recorded at Site 2 are tolerant of poorer water quality. Site 1 had the fewest macroinvertebrates and least overall diversity.

The results would therefore indicate that water quality in Lough Bracken is of at least moderate status. Between the sites, Sites 3 & 4 showed greatest diversity. These are also the least disturbed of the sites with most intact vegetation communities. The diversity of predatory species would tend to indicate a generally good overall diversity of macroinvertebrates at Lough Bracken. This would indicate generally good habitat availability within the sampled areas.

### **3.5 Amenities Survey**

This section reviews the current amenities on the site and gives an estimation of the current usability, functionality and ‘fit-for-purpose’ overview of the current site infrastructure. Details of the proposed upgrades, installations and stabilisation works required for these aspects of site infrastructure are included in the Landscape Masterplan document and are discussed in Section 4 of this report.

#### **3.5.1 Angling stands**

Angling is one of the main formal activities carried out at Lough Bracken. At least 10 formal and informal angling stands are found along the lake shore. Most of these are informal and consist of areas of cleared bank vegetation. Three formal angling stands were previously installed by Inland Fisheries Ireland. These however, have been poorly maintained and appear to be rarely used.

**Figure 5: One of the lake’s current poorly maintained angling stands**



Erosion has become a major concern at a number of these stands and gabions have been placed along the track to halt any further subsidence. A rehabilitation plan and angling stand design has been provided in the Landscape Masterplan document. This consists of bank stabilisation works and the creation of permanent ecologically sensitive angling stand designs.

**Figure 6: Severe erosion around informal angling stand**



On the eastern side of the lake, accessed for angling has created erosion of the bank with some near-vertical slopes being created. These are very close to the main (informal) access track and as such are somewhat hazardous for walkers and other site users. Gabions have been placed in order to reinforce the bank. However, these cannot be considered a safe surface for angler access.

Aesthetically they are also poorly located and will never become revegetated. A plan for the rehabilitation of this area as well as angling stand designs have been provided in the Landscape Masterplan document. This allows for bank stabilisation works with natural materials and the creation of permanent and more ecologically sensitive angling stands.

### **3.5.2 Walking Tracks**

The entire lake is looped by a 1km walking track. Track condition and surface varies significantly along its extent. Going clockwise from the car park the track is composed of crushed rock but has become muddy due to lack of maintenance, footfall and cattle access. A stile is found approximately 200 metres from the trail head. This has become obsolete as cattle bypass it through the lake and poached shoreline. Beyond the stile the track becomes informal as it moves through marsh and agricultural grassland, crossing a bridge into further open grassland before arriving at the water pumping station.

From there two trail options exist. The pump station access road can be followed through an area of Coillte plantation woodland before looping back to the lake car park entrance. This is evidently already a popular walking and cycling route for locals and allows access for all abilities. The second trail option continues around an informal and likely rarely used trail along the lake's western shoreline. Here, excellent mature riparian woodland, reed fringes and mature mixed woodland flank the walkway. Track condition is informal with some areas being muddy even in mid-summer and other areas drier as they enter the plantation woodland. No track markings exist and it becomes easy to lose the main trail in places. Closer to the car park the track opens up as you emerge from the woodland. This area is one of the most heavily trafficked portions of the lakeshore for anglers. No formal track exists here and soil erosion and the exposure of tree roots were noted through this area. A raised walking platform extends from the car park for the last 20 metres of the lake loop to help site users avoid a seasonally flooded area. This platform is narrow and would not be suitable for all site users.

**Figure 7: Semi-formal track near the car park. The hedgerow on the left of this photo has sadly been removed**





### **3.5.3 Car Parking Area**

The car park is approximately 0.1 hectares of tarmac with kerbing surrounding the edges. The western edge of the car park contains a small area of unkept amenity grassland that is surrounded by trees. The car park is in good condition with minimal amounts of weeds growing up through the tarmac and no broken or damaged kerbs.

The small amenity grassland area does not appear to be regularly maintained and appears rarely used. Similarly to above, a well-kept grassed area will give an overall impression of order. The converse of this is also true. It is believed that the lack of maintenance here has contributed to some of the anti-social behaviour here including littering. However, it should also be noted that such incidents were not regularly noted throughout the project period. Most users of Lough Bracken were seen to take litter home and parked responsibly.

## **3.6 Stakeholder Engagement Survey**

An online survey of Lough Bracken's public stakeholders was carried out. Two online surveys were distributed. A stakeholder and local survey was distributed amongst members of the Drumconrath Tidy Towns Groups and The Drogheda Swimming Club. These groups in turn shared

access to the survey on their social media and amongst their members. A separate survey was produced aimed at members of the Navan Anglers, which focused more on access and fishing. The questions posed in these surveys and a summary of the answers is shown in Appendix 1. A summary of the findings is presented below.

### **3.6.1 Conclusion of the stakeholder engagement survey**

A total of 10 responses were collected from the community groups' and recreational users' stakeholder survey. Almost all spoke of the natural beauty and tranquillity of Lough Bracken and the woodlands as an important reason for visiting the site. Improved access for walkers, including better trails around the Lough and better associated infrastructure, including seating and picnic areas would improve users' experience and site usability. Many noted swimming and improved swimming infrastructure and safety as requiring improvement. This includes safety buoys around the lakeshore and in-water buoys to guide swimmers around the lake. Negative aspects of site usability include litter and rubbish left around the car park and the general unkept look and feel of the car park area.

### **3.6.2 Conclusion of the anglers' engagement survey**

A total of 12 responses were collected from the anglers' survey. All noted Lough Bracken as an excellent fishing lake with the added draw of tranquillity, peace and quiet. Long-term lake users have noticed a drop off in larger fish, particularly Pike, over the long-term and consider poaching and illegal netting to be a major contributing factor to this. Most believe that overall, fish stocks in the lake are reasonably healthy and/or recovering. Access along the lakeshore and the lack of quality angling stands was noted by all as needing improvement. This is also impacting usage patterns as poor routes around the lake are acting to inhibit anglers with lots of fishing gear from going too far from the car park. Issues around anti-social behaviour and litter were the main negatives for anglers using Lough Bracken.

## **3.7 Review of Threats and Pressures to Lough Bracken**

Based on a review of the surveys of the current site condition, the surrounding environment and a review of stakeholder engagement, the main threats to the continued function of Lough Bracken as an amenity, water and natural heritage resource have been identified and are described below.

### 3.7.1 Poaching and Eutrophication

A defining feature of Marl lakes is that of low nutrient contents and high pH. Poaching particularly around the eastern and southern edges of the lake have impacted nutrient cycles and water quality within the lake.

**Figure 8: Poaching from cattle along the shoreline**



Irish Water has reported difficulties with high-levels of Trihalomethanes (THMs) and algae blooms which are common occurrences due to poor water quality. This results in difficulty bringing water to acceptable standards for drinking water. It also impacts the lake as an amenity resource. Eutrophication and algal bloom make the lake unsafe for swimming. They also create poor oxygen levels which impact fish health and subsequently fish stocks.

### 3.7.2 Rubbish and Sanitary Issues

Like many drive-in sites in the country, rubbish, fly tipping and even well-meaning users not bringing their rubbish home are impacting the lough as an amenity. The car park area in particular has littering problems. On all visits rubbish was noted around the car park, the walking track and at the entrance to the lake. This has a major impact upon the appearance of the site and also stakeholders' perception of the space.

Evidence of public defecation and urination were seen commonly within the adjoining woodlands and scrub areas around the lake. The lack of public toilet facilities, particularly for users who may be at the lake for several hours, is further impacting the perception and safety of the lake for all users.

**Figure 9: Rubbish and fly tipping in the car park**



### **3.7.3 Collapsing Angling Stands**

Collapsing and widening of angling stands is another major concern for the ongoing function of the lake. Year round use of the lake, coupled with a prolonged period where no maintenance has occurred, has left some areas becoming severely undercut. This has led to more losses of sediments and nutrients to the lake and impacts on the site's amenity value. This is particularly apparent along the eastern shoreline where the lake abruptly drops off to a higher depth. This issue is further exacerbated through anglers cutting back vegetation and making informal paths down to the water's edge.

**Figure 10: Gabions used to halt further bankside collapse. This area is also used as an informal angling stand**



## **4 Enhancement Master Plan**

This masterplan outlines a proposal for future development of the lake that will bring together the results of the baseline studies, ecological assessments and stakeholder consultation. Provided here is an overview of the main details of the plan. The Landscape Masterplan is presented as a separate document.

### **4.1 Angling stands**

To improve the usability and sustainability of Lough bracken for anglers, the total number and distribution of angling stands is to be increased to eight around the lake shoreline. The largest proportion of these are to be located along the lake's eastern shoreline where the deepest water is known to occur. The shoreline here is the area most in need of repair. The necessary works will allow the opportunity for the inclusion of more functional and sustainable angling stands.

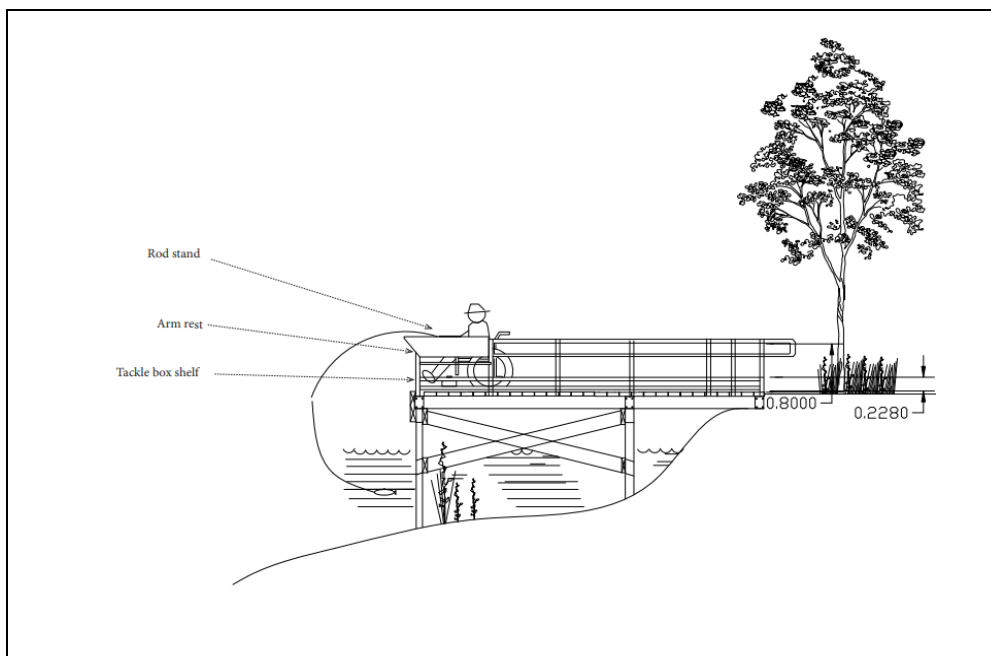
The location of the stands will be chosen so as to allow sufficient space within swims for the maximum number of anglers using them. The areas will be free from obstacles that allow access to the stand as well as from overhanging vegetation which may impede casting. Insofar as possible, natural materials (such as Willow and Alder) will be used to construct new stands and to landscape around them.

Existing IFI-installed stands are to be improved. In some instances, this may merely require the addition or improvement of access to the stand. This will assist in reducing damage to areas of vegetation around the stands that are being traversed by anglers. In other areas, it is recommended that an existing peg is formalised by the addition of a stand. This will assist in preventing anglers from damaging woody vegetation (e.g. cutting tree branches) to clear angling areas.

#### 4.1.1 Accessible Angling stands

A universal access fishing stand to complement or replace existing fishing stands will be accessible via the boardwalk. This will allow multiple users to fish from the platform at one time. The fishing stand will include rod stands, arm rests, a tackle box shelf and full turning space with a safer toe board / tipping rail against the water's edge.

**Figure 11: Proposed design for accessible angling stands - Lough Bracken Masterplan**



## 4.2 Walking Tracks

Walking tracks have been designed based on the multifaceted use of the lake circulation patterns which allow for the management of recreational users, anglers, families and people of all abilities. Trail loops are designed to accommodate various grades of ability and encourage a wide range of members of the community to enjoy being outdoors and accessing outdoor activities in a fun interactive manner. Where all access trails are proposed these are designed according to the guidelines produced by the Irish Wheelchair Association and Sports Ireland.

The use of boardwalks in places is to encourage recreational users and others to follow the assigned trails and to facilitate habitat restoration and prevent lake shore erosion.

A boardwalk is proposed to replace all other routes to the lake from the car park to the bird hide, swimming area, picnic area and angling stand. This needs to be completely accessible with anti-slip surface treatment to boards. Areas liable to occasional flooding should be composed of durable modified wood, with non-toxic and slip resistant or recycled plastic materials with comparable properties. Recreational users are encouraged to utilise the prescribed trails to prevent vegetative wear and soil erosion to areas outside designated trails. Plant life should be encouraged beneath the boardwalk but managed so as not to encroach above the boards. Existing trees and vegetation are to be protected during construction by avoiding any loading or trenching of the root zone. This boardwalk should be a minimum of 2000mm wide to ensure comfortable passage of wheelchairs /pushchairs /strollers. The boardwalk should be at least 600mm above the high water mark. A toe board or tipping rail of at least 150mm should extend the length of the boardwalk to provide alignment for visually impaired users and to prevent wheel slippage at the boardwalk edge. Handrails could be broadened at specific sites to give habitat information both visually and in tactile format.

**Figure 13: Example of universally accessible boardwalk suitable for the lake shore**



Forestry trees will be removed in some areas to facilitate woodland boardwalks and trails to be created. This will also provide space and opportunities for micro sites and ecological enhancement works, particularly along the lake's western shoreline. Where possible, conifers should be preferentially removed over native and deciduous tree species. This woodland walkway will encourage users away from the shoreline to help with habitat restoration and riparian zone recovery. Angling stands and swimming areas will diverge off this walking trail. By attracting families, accommodating trail users capable of using both general and more challenging trails, anglers, the bird watching community and nature lovers, maintaining a dawn to dusk opening policy, the area is also protected against anti-social behaviour.

All walking track loops are to be clearly mapped at the car park showing site amenities along each route.

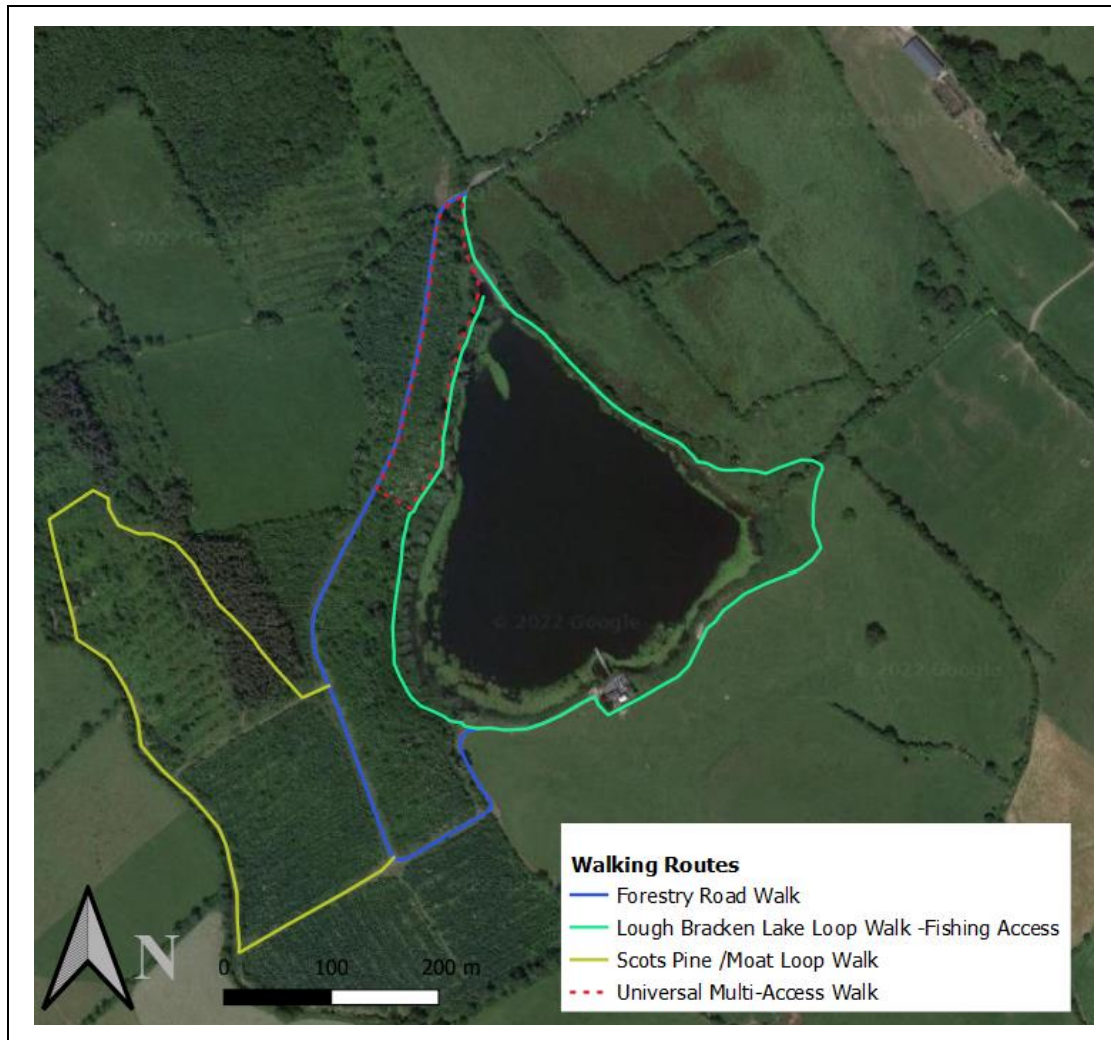
#### **4.2.1 Universal Multi-Access Walk**

The initial 250 metres of the western edge of the track leading to the small picnic area and swimming area will provide wheelchair/buggy friendly accessibility. This would provide access to a number of site amenities, including wheelchair accessible angling stands, children's swimming



areas and beach, and the bird hide. This route section would then loop back onto the pump station road via a small woodland picnic area and kids' playground.

**Figure 14: Overview of the range of new and current walking amenities**



#### **4.2.2 Forestry Road Walk**

The pump station and forestry access road is already a popular walking and cycling route for locals. This will be maintained as is and will allow access between the amenity sites and the other walking routes situated around the lake and the surrounding forestry.

#### **4.2.3 Lake Loop**

The total lake loop is approximately 1km and broadly follows the previous lake loop walk. The trail will be constructed using a cellular confinement system such as Geoweb. This will keep the removal of soil to a minimum and help maintain the character of the main walking loop while ensuring the root systems of the existing hedgerows and trees are protected during both the

construction and operational phase of the scheme. The geocell should have a base liner to filter silt and sediment and to prevent them entering the lake. The geocell should also have variable widths according to the path width available without causing damage or removal of trees. This path should be between 1000mm-1200mm wide at its narrowest point. Where seasonal flooding is an issue the walkway will be placed on a raised platform. New footbridges or improvements to the existing footbridge will also be required to span the stream at the lake's south eastern corner.

**Figure 15: Proposed Geocell track design and boardwalk design where seasonal flooding is a concern**



#### **4.2.4 Forestry Loop**

A forestry loop to include woodland trails and forestry roads is proposed. This series of trails will mostly follow existing trails through the Coillte plantation roadways. In addition to these, a new trail through an area of Scots Pine woodland is proposed. The route would cover approximately 1km and will guide users uphill to the historic moat and viewing platform overlooking Lough Bracken, before looping users back either via existing forest roadways or back through the Scots pine woodland. The woodland walk is proposed for construction out of geocell with fine crushed local stone. The existing forestry pathways are to be maintained as is.

### **4.3 Child Safe Swimming Area**

A child safe swimming area is proposed for the western shoreline along the universal access walking trail. This floating pier will create an enclosure/edge at shallow depths to allow children ease of access and to ensure it is as safe as possible. Jetty ladders will be placed at frequent

intervals to facilitate all swimming abilities. The end of the jetty should be in deeper water to create a safe place for experienced swimmers to begin open water swimming from.

Bank works and some minor in-stream works will be required to grade the shoreline and to remove loose soils and silts. Clean beach sand should then be added from the shoreline, grading into the water to make it appealing for sitting and relaxing and allow easy ingress and egress of the water. Stone might be required to reduce the depth until sand can be poured into the water to create the desired depth of water. This would be likely less than half a metre in depth and extend back up the shoreline to make a small beach. A number of picnic benches could also be placed around the beach areas which are in view of the swimming area for parents and families. Benches for changing and showers that are accessible from the platform should also be made available for bathers.

The area will also act as a start point for open water and more experienced swimmers to set off from. Buoys are to be installed in the water to guide swimmers along the safest route around the lake and to provide distance markers. Lifesaving equipment will also be available in this area.

#### **4.4 Bird Hides**

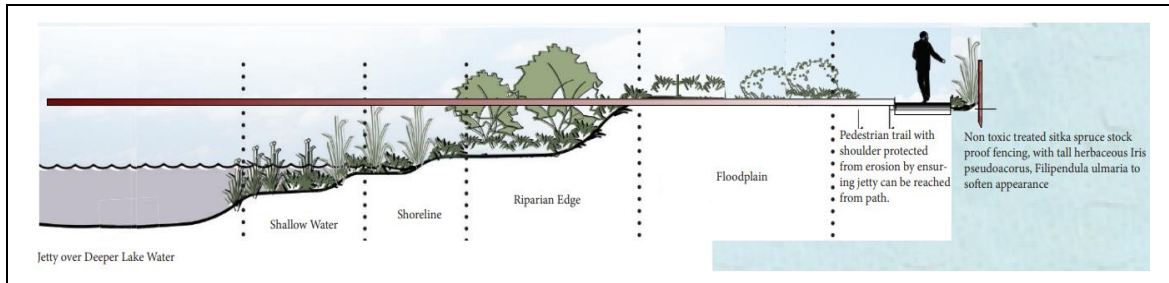
A number of excellent opportunities exist for installing bird hides around the lake shore. Bird hides are proposed along the lake's western shore approximately 300 metres from the car park. This will be an all-access facility with a floor plan allowing wheelchair turning and wide doors. The back wall can be used to display relevant bird and habitat information for this location. The hides' hatch space will be designed to accommodate wheelchairs with shelf space to allow for arm rest, binoculars, camera equipment etc. Extra leg room will allow for a generous and comfortable hide for all users. A number of proposed designs are provided for in this Masterplan document.

#### **4.5 Fencing**

Treated posts and rail fences are to be constructed along the lake's southern and eastern shoreline. These will be placed at a contour at least 600cm above the high water level of the lake. The walking track is to be placed on the inside of this fence line. This pathway will be constructed of a simple gravel pathway with geocell. Water troughs with nose pumps will be placed outside the fence line to provide water to stock. A mixture of selective planting of worst affected poached areas with plant stock collected from healthier areas of reed fringe will be carried out. Natural

regeneration will also be allowed to help restore the lake shore habitats. This fence will extend along the southern shoreline and towards the eastern shore, keeping to the eastern side of the existing bridge. An agreement should be sought with this farmer to allow the wetter portions of this land area to be fenced into the lake. Fencing is also lacking along the eastern shoreline. Where possible this fence should follow the farmer's field and should fence in the recently removed hedgerow, allowing natural regeneration in addition to some selective planting.

**Figure 17: The eventual rehabilitation of the lough's southern shore following natural regeneration**



## 4.6 Picnic and Amenity Areas

Adjacent to the existing car park, the area of unused amenity grassland is proposed as a picnic area with a toilet and changing room facility. Proposed is a universal access compost toilet. This involves dry composting using wood shavings to a vault chamber with a vent pipe, along with fully accessible ceramic urinals, grab rails, anti-scald tap settings, and door handles to ensure they are accessible to all. This toilet block could be fitted with a solar panel roof to provide hot water for hand washing. This block will be connected by boardwalk to the rest of the universal access areas.

A series of interlinking picnic areas are to be created within the amenity area beside the car park. Here, clearly defined picnic areas are proposed within the grassland. This aims to encourage users to use the benches and boardwalk to reduce erosion and compaction issues within the grassland surrounding the boardwalk. This area will also provide a simple log circle on a wood chip base for more informal and child friendly picnicking.

To create a more naturalised atmosphere in this area, a number of the non-native commercial conifers are to be removed and replaced with fruiting trees including apples, pears and plums along with native tree species. Larch removed from this area could be reused to make the split log benches. This has been provisionally discussed with the local Coillte manager but will require

further authorisation. Grasslands and wetland species should be allowed to naturally recolonise this area post-works. The narrow margin of grass to the edge of the car park should be maintained by mowing during the summer months, with the vegetation to the rear of the stone groupings to be allowed to regenerate. Late mowing in August or September is proposed as the best approach to promote wildflowers and to encourage pollinators including bees and butterflies.

## **4.7 Car Parking and Cycling**

The car park is approximately 0.1 hectares of tarmac with kerbing surrounding the edges. The western edge of the car park is bounded by a small area of amenity grassland that appears to be unmanaged. This is fringed to the west by semi-mature and mature trees. The car park was seen to be in good condition overall. The surface is largely intact and suitable for use. There were minimal amounts of weeds growing within the paved area and there were no broken or damaged kerbs. It would be important that this area is kept in good condition in order to minimise anti-social behaviour such as littering or fly-tipping here. A well-kept area is less likely to attract damaging behaviour or activities.

In order to improve the appearance of the car park, it is recommended that at a minimum, a strip of grass on the edge of the grassed area is kept mown short. Outside of this, a larger area may be managed as a wildflower area within which the picnic and playground will be contained. Suitable flowering plants such as Meadowsweet and Speedwell may be encouraged or introduced. See extensive planting list suggestions at [pollinators.ie](http://pollinators.ie).

It is recommended that picnic/resting furniture is installed adjacent to the car park. This should be made of organic materials in order to have a natural feel. Simple, split-log benches and platforms are recommended. Boulders may also be used (partially buried) as platforms or to delineate areas as visitors approach Lough Bracken.

### **4.7.1 Facilities for Cyclists**

It is recommended that Lough Bracken is made as cyclist-friendly as possible. This will not allow for cyclists to access the more sensitive areas of the lake, but will indicate where cycling is possible and encouraged. The facilities should include a secure bicycle-parking rack. This should be of suitable design and in a prominent and visible location. The road surface as far as the car parking

area should be safe for bicycle users of all levels. Signage should inform other road users to be alert to cyclists in this area.

It is recommended that signage here should include information for cyclists. This should include a map of which parts of Lough Bracken are open to bicycle traffic. It should explain why cycle access is not allowed in other areas. It should also include information on cycling in the wider area.

#### **4.7.2 Signage**

It is recommended that signage be installed to inform a range of visitors at Lough Bracken. Signage at time of survey was limited to information on angling regulations for the lake. Some of this was informal and in poor condition.

The key information that should be provided will be a description of the amenity here and its accessibility. To this end, the main graphic should show the extent of paths, trails and other walkable areas. A portion of the paths here will be universal access and this is to be clearly indicated. The remainder of the paths and trails should be clearly shown along with their level of difficulty and whether they are appropriate for buggies, children or those with reduced mobility. The distances of the individual paths and trails should be given along with an indicative time that would be required to complete these.

Angling information is to be displayed. This should include the requirements for permits and up to date information on where permits may be obtained. The signage should also contain information on the quarry species. The bye-laws and other regulations on catch limits are to be clearly displayed. Inland Fisheries Ireland is to be consulted during the designing of this signage. The graphics on this portion of the sign should include locations of angling stands and their relative accessibility.

A key component of the signage is environmental information. This should highlight the importance of clean water at Lough Bracken and the lake's significance for water supply. The factors that place pressure on water quality should be explained in clear terms. The ecological significance of Lough Bracken is also to be highlighted. This should be achieved with photographs or artwork displaying some key species. Both plants and animals (including invertebrates) should be displayed. It will be important that the signage depicts species that the visitors are likely to

see. Mute Swans and Great Crested Grebe are suggested. Information on what visitors may do to help such species should be given in a clear manner. For example, the potential negative impacts of feeding wild species should be explained. Visitors' responsibility in terms of litter and waste and their potential impacts on such species should also be explained.

It is proposed that signage be installed at heights that may be read by younger visitors and those who are wheelchair users. Consideration should be given to incorporating signage into other structures. For example, hand-rails or fencing may be used for mounting signage and obviating the need for further standalone structures. It is anticipated that many visitors will have smartphones. The use of QR codes may be considered in order to develop more resources that can be made available online. This could be on wild species or to access detailed trail guides to Lough Bracken.

A sentence or two on biosecurity and appropriate would be important here! Check out <https://invasivespeciesireland.com/biosecurity/> and IFI website.

#### **4.7.3 Trail Markers and Signage**

It is proposed that the trails outlined in the Masterplan are indicated using simple trail marker posts. A colour-code system should be used, as well as each of the trails being given clear and distinct names. Where a trail is looped, this should be indicated. It is recommended that wooden posts are used with directional colour-coded arrows. As with larger signage, arrows may also be affixed to existing or planned structures (e.g. stiles and gates). Ground-level markers may also be used. These are often popular with children, being readily visible and followed by them (e.g. representations of mammal or bird tracks as shown in the Masterplan). These also have the advantage of having minimal visual impact.

It is recommended that minimal signage is put in place away from the trailhead. This is in order to avoid any unnecessary visual impact. This will also reduce the levels of maintenance required and save on expenditure.

### **4.8 Playground**

The current amenity grassland will also provide space for a universal access children's playground. Nature-based play structures will include slides, swings and a climbable castle structure. A soft rubber surface specified for play areas with universal ability to negotiate the play space is

proposed. The playground will be bounded with easy-close gates separating the picnic area from the play space. Gates are to be opened from dawn until dusk. Benches will be provided within the play area.

#### **4.9 Tree Planting**

In the car park Beech, Sycamore and Horse Chestnut trees have either been planted or have self-seeded over time. These trees should be maintained where possible. Clearance of non-native commercial conifers around the car park and around the lake's eastern shoreline will provide opportunities for ecological enhancement, particularly tree planting.

Oaks are rare around the lake in what would otherwise be a very suitable habitat for them. Opportunities exist for planting oaks along with other natives including Birch, Rowan and Holly. Birch and Rowan would be most suitable for planting in areas where Sitka Spruce have been removed as they are most tolerant to acidic conditions created by plantation forestry. Where light availability is best, fruit trees including Apples, Pears and Plums should be planted.

## **5 Conclusion**

Following surveys and consultation, a range of enhancements and additions to Lough Bracken have been proposed. These are presented in the form of a Masterplan for the area. Various elements of the Masterplan may be implemented independently. However, the plan has been developed to allow complementarity to benefit Lough Bracken as an amenity for different users.

A number of surveys were carried out to examine the overall health and functioning of Lough Bracken as a source for water supply, a fishery and an amenity area. Over the course of the surveys it was seen that there are pressures on the water quality at the lake which are in need of resolution to maintain its role as a sustainable water supply source. Lough Bracken is a popular venue for anglers who come from some distance away and from large urban centres. It is also utilised by swimming and triathlon clubs who are also prepared to travel some distance to make use of this amenity.



However, all of the current uses of the lake were seen to be limited, to different extents, by prevailing conditions at or around the lake. Most of these relate to the land-use of the surrounding lands, but several limiting factors relate to factors such as trail condition and access to the lakeshore. The need to address these factors and to enhance and upgrade the existing facilities was made clear through surveys and consultation with users. The key visitor uses of Lough Bracken relate to angling and walking and to a lesser extent swimming. In this regard, proposed enhancements have been identified to address these.

As part of the ecological assessment, the lake fringe vegetation was assessed. Damaging activity from livestock was noted as a key factor to be addressed. To a lesser extent, angling activity has had some negative impacts on the lakeshore habitats.

Water quality in Lough Bracken is 'Moderate' and considered 'At Risk', notably from phosphate enrichment, eutrophication and water abstraction for the village of Drumconrath. A number of targeted approaches are needed to address the issues identified. These might include the creation of vegetative buffer zones around the lake perimeter, fencing, with the provision of alternative water sources for livestock, more efficient use of fertilisers and pesticides and employing more ecologically friendly land drainage practices.

A rather diverse range of habitats was recorded at Lough Bracken. These ranged from valuable natural habitats such as riparian woodland and marsh, semi-natural grassland areas to some highly-modified habitats like conifer plantation. A key asset of Lough Bracken as an amenity for walkers or birdwatchers is this range of habitats which may readily be encountered in a single visit. Non-native species were not a significant negative factor at this site. The removal of some semi-natural scrub areas during the course of these surveys has diminished the quality of the site for breeding birds. The presence of coniferous plantations on surrounding slopes has also been a limiting factor for native flora as well as bird species.

The lake continues to be a valuable coarse fishery with Bream and Roach being among the popular quarry species here. Stocking of the lake with Rainbow Trout is unlikely to be repeated. No significant enhancement to Lough Bracken as a fishery is considered necessary. However, all of the proposed measures have been drawn up with due consideration to the importance of angling

at the Lake. These include new angling stands, improvements to existing stands and the creation of fish spawning areas as part of swimming area and beach proposed for the lake shore.

There are effectively no amenities for walkers at Lough Bracken, with the exception of some stiles installed by IFI for anglers. This project proposes the development of a number of walking routes which largely utilise existing access but also the creation of interesting new trails which will utilise the conifer plantations to the north and northwest of the lake. These will be interpreted with trailhead signage and indicated with colour-coded posts.

Toilet and changing facilities are also proposed as part of the master plan. This will help improve the usability and functionality of the Lough for all users but particularly families and people who spend extended periods of time at the Lough.

A safe swimming area will be created, allowing swimmers to enter at different depths. Beach sand will be imported to create a safe and attractive substrate. The outer edges of this may be used to enhance fish spawning areas. A structure for providing changing areas is also proposed.

A bird hide is proposed for Lough Bracken. This should be easily accessed by users of all mobility levels. The hide may also be used to display information on the lake's birds as well as other ecological information.

Key to the success of the project will be the installation of fencing on the southern and south-eastern portions of the lake. This will prevent the ongoing impact of cattle poaching of the shoreline and nutrient enrichment of the lake here. The fencing design should be created with due regard to the proposed walking route at this part of the lake.

The entrance to the lake area offers much potential for the location of an amenity area. It is recommended that some clearance of non-native trees takes place in order to allow this. However, native tree species will be proposed for landscaping of this area. Oaks are proposed to be among the species included as these are under-represented in the wider area. A natural play area is proposed as part of the overall development. It is not proposed to increase the overall surface area of the car park but measures to improve the layout (e.g. delineating parking spaces) should be implemented.

There is a need for high quality signage at the entrance to Lough Bracken. It is proposed that this should be consolidated insofar as possible in order to avoid signage clutter. Information on angling, biodiversity, biosecurity and water quality should be included on this. A clear trail map should also be a priority. Where possible, other signage should be mounted on other structures in order to reduce the need for further standalone signposts or boards.

## Appendix 1: Stakeholder and Angler Consultation Results

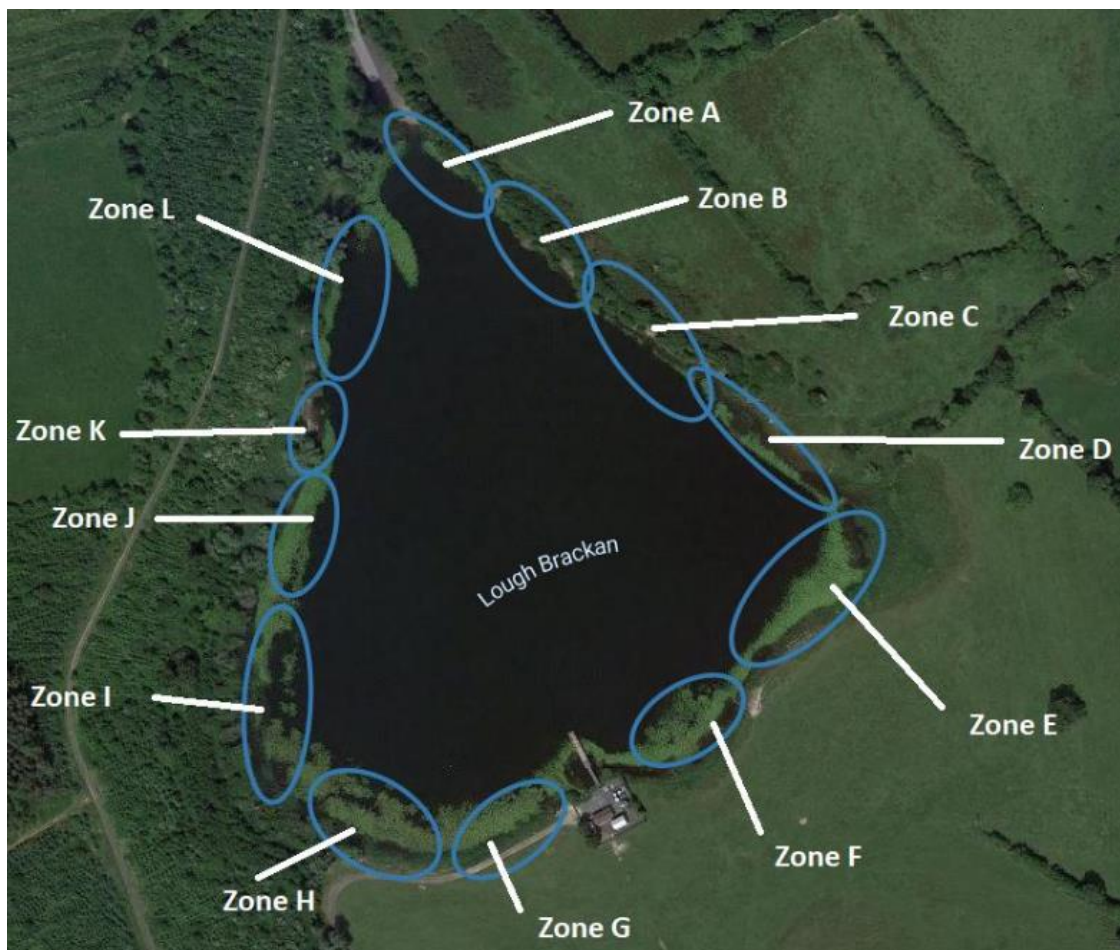
Locals and Community Groups Survey	
<b>Why do you visit Lough Bracken? Feel free to give more than one reason.</b>	Most respondents noted walking, exercise and swimming as the main activities which people visited Lough Bracken for. Almost all surveyed noted the area's natural beauty and wildlife as an important draw and a source of pleasure from visiting the site.
<b>How often would you visit Lough Bracken?</b>	50% of respondents visited the Lough once a week, while around 20% visited occasionally and the remainder monthly.
<b>What do you like most about Lough Bracken?</b>	Peace, tranquillity and being close to nature were all sighted by stakeholders of Lough Bracken. Walks and scenery were also commonly noted as key attributes.
<b>Is there anything about Lough Bracken that you think needs to be changed or improved?</b>	The provision of better quality walkways was the main improvement sighted by stakeholders. Better seating, benches and picnic areas were also noted. Litter and untidy areas around the entrance and car park were highlighted by a number of respondents as needing improvement.
<b>What changes would you like to see to this site, in terms of its recreational use?</b>	As before, better quality walkway and seating areas was a key recreational improvement noted for visitors and regular users. Many also noted water sports and improved water safety infrastructure including safety buoys for swimmers around the lake and shoreline.
<b>What do you think the priorities should be for improving the lake? In other words, what changes would you like to see made first?</b>	The priority improvements listed by respondents included: <ol style="list-style-type: none"> <li>1. Access and walking trails around the lake and through the woodland</li> <li>2. Improvements in access for Fishing including angling stands</li> <li>3. Upgrade jetty's and add life buoys</li> </ol>

Anglers Survey	
<b>How often would you visit Lough Bracken for fishing?</b>	80% of respondents said they visited the lake weekly to fish. The remainder was split between daily or monthly visitors.
<b>What do you like most about fishing in Lough Bracken?</b>	

<p>Peace, solitude and scenery were the most commonly sighted reasons for liking Lough Bracken.</p> <p>Good fishing and easy access and parking were also highlighted in most instances.</p>	
<p><b>Is there anything about fishing in Lough Bracken that you think needs to be changed or improved?</b></p>	
<p>Better access all around the lake and improved angling stand were highlighted as areas requiring improvement by most respondents. Anti-social behaviour and litter, particularly around the car park was also of concern.</p>	
<p><b>What is your opinion of current fish stocks in the lake and how have they changed over time?</b></p>	
<p>The status of mature fish including Pike, Perch and Bream was noted as having dropped in recent years. Smaller and immature fish particularly Tench were noted by most, as significant and supporting good sport fishing. Long-time users note a significant decline in larger fishing over the past 10 or 20 years and suggest that illegal fishing is likely a leading cause. However they generally feel that this pressure has decreased in recent years.</p>	
<p><b>Was fishing better in the past or has it improved? Give reasons for why it may have been better in the past if that is the case i.e. more fish, better access, change in water quality, etc</b></p>	
<p>As stated above the size and species assemblage most often caught has changed over the years. Larger Pike have become more scarce while Tench is now becoming the most abundant fish caught in Lough Bracken. Poaching and netting is again noted as the likely cause of the changes in catch.</p>	
<p><b>In your experience what is the most commonly caught fish from Lough Bracken</b></p> <p><b>You can select multiple options.</b></p>	
<b>Fish Species</b>	<b>Respondents noting species as most commonly caught</b>
Perch	4
Roach	6
Pike	3
Rudd	2
Perch (immature)	0
Roach (immature)	3
Pike (immature)	1
Rudd (immature)	4
Tench	6

Tench and Roach were the most commonly caught fish in the lake. Pike were the most scarcely recorded fish species noted by respondents.

**Please indicate which zone as shown on the previous image is your favourite area for fishing.**



Our survey indicated that Zone C and Zone L were most popular amongst anglers. The zones around these areas were second only to C and L in popularity. No respondent cited zones E to I as favoured fishing spots.

Access is one of the key drivers in the distribution of favoured spots in addition to deep water along the lakes eastern shoreline, respondents sighted certain types of fish at particular times of the year gathering in deeper water. Most respondents suggested that improved accessibility around the lake would broaden the usage patterns around the lake shore.

**What aspects of site management or use are impacting most negatively on fishing in the Lough?**

Access issues along the lake loop track was the most commonly sighted aspect of site management impacting most negatively on fishing in the Lough.

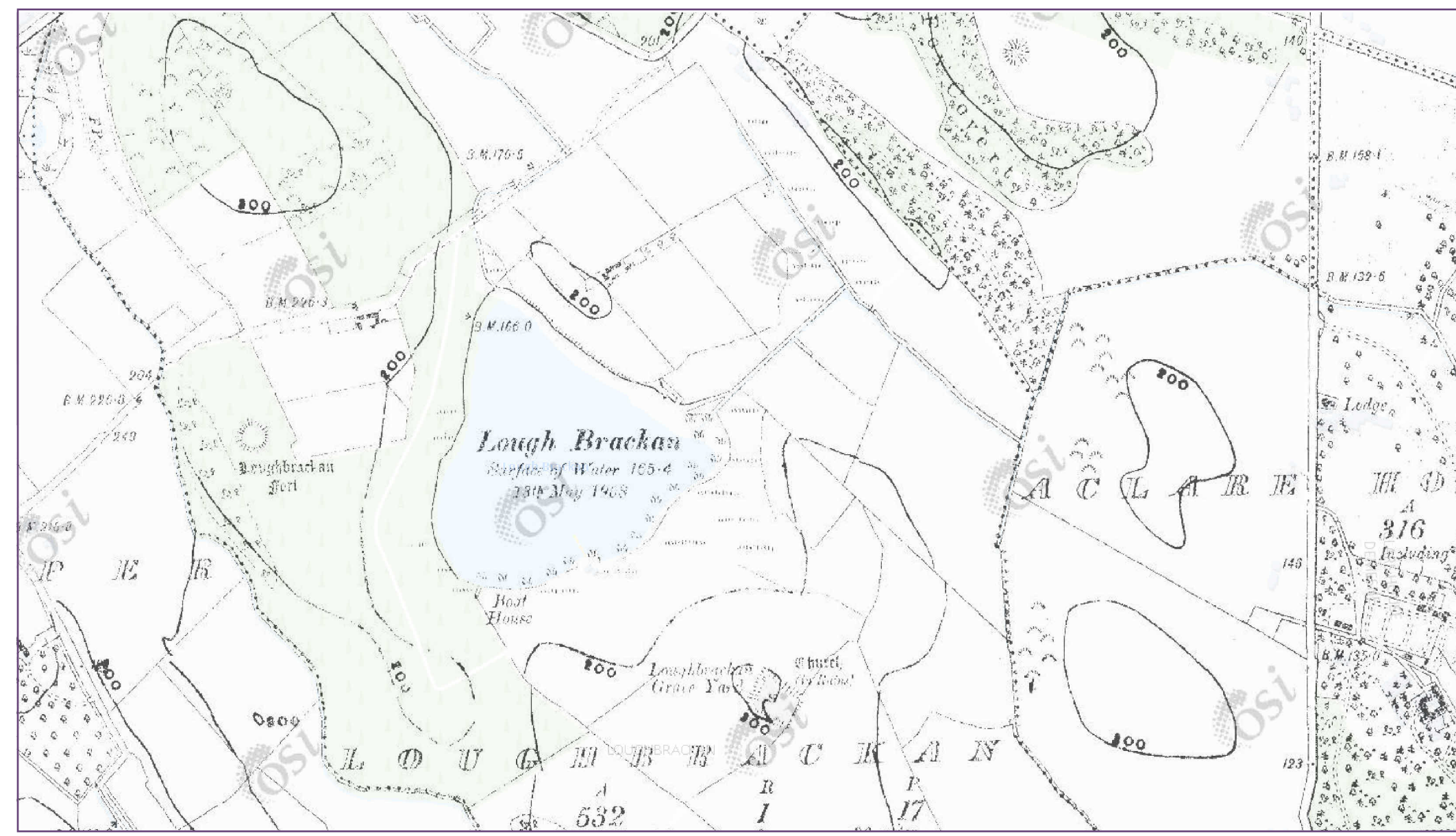
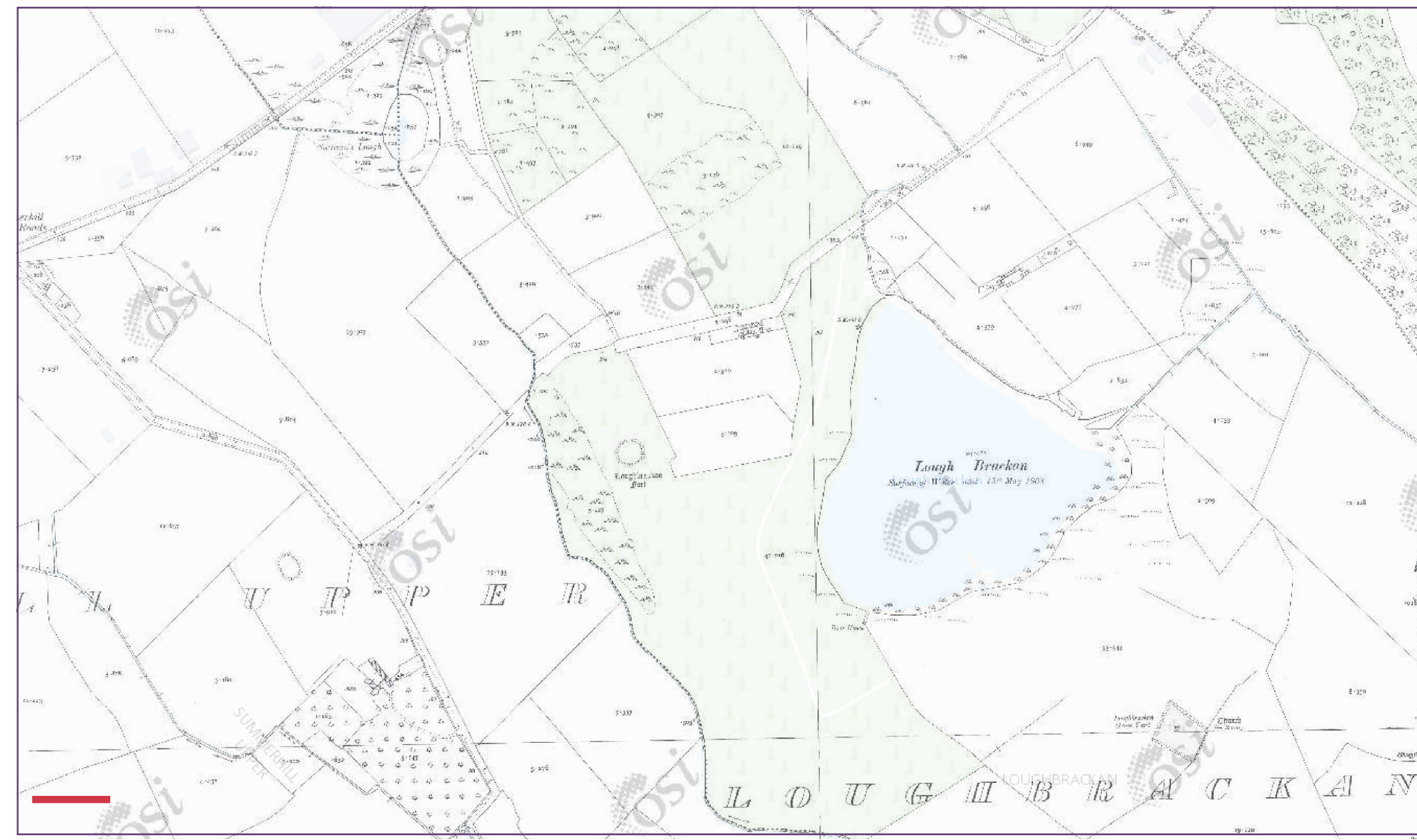
Rubbish and anti-social behaviour is also considered problematic. Particularly on the weekends and throughout the summer.
<b>What aspects of site management or use are impacting most positivity on fishing in the Lough?</b>
The excellent work of the Angling Club, the local swimming club and local community groups has been praised for keeping the Lough tidy and carrying out maintenance like grass cutting.
<b>Have you any other comments or suggestions that you'd like to make?</b>
<p>A range of possible suggestions for improvement of the usability of Lough Bracken were put forward.</p> <p>These included:</p> <ul style="list-style-type: none"> <li>● Better angling stands all around the lake shore</li> <li>● Better walking routes providing access to all sides of the lake.</li> <li>● Restocking of fish particularly Bream</li> <li>● More patrols for IFI</li> <li>● Better facilities for swimmers, including a sandy area for entering and exiting the water. bouys in the water to direct swimmers on the best routes to swim.</li> <li>● Toilet facilities</li> </ul>

## Appendix 2: Macro Invertebrate Results

Site Number	Taxon Name	Quantity	Common Name	Order	Sensitivity
1	<i>Asellus aquaticus</i>	2	Freshwater Hoglouse	Isopoda	Very Tolerant
1	<i>Corixa sp.</i>	1	Lesser Water Boatman	Hemiptera	Very Tolerant
1	<i>Gammarus sp.</i>	1	Freshwater Shrimp	Amphipoda	Moderately Tolerant
1	<i>Agabus sp.</i>	1	Water Beetle	Coleoptera	Moderately Tolerant
1	<i>Forficula auricularia</i>	1	Earwig	Dermaptera	N/A
2	<i>Lype sp.</i>	1	Caddis Fly	Trichoptera	Moderately Sensitive
2	<i>Culicidae sp.</i>	7	Mosquito	Diptera	Very Tolerant
2	<i>Baetidae sp.</i>	1	Mayfly	Ephemeroptera	Moderately Sensitive
2	<i>Agabus sp.</i>	1	Water Beetle	Coleoptera	Moderately Tolerant
2	<i>Corixa sp.</i>	1	Lesser Water Boatman	Hemiptera	Very Tolerant
3	<i>Gerris sp.</i>	1	Pond Skater	Hemiptera	Moderately Tolerant
3	<i>Baetidae sp.</i>	3	Mayfly	Ephemeroptera	Moderately Sensitive
3	<i>Corixa sp.</i>	8	Lesser Water Boatman	Hemiptera	Moderately Tolerant
3	<i>Culicidae sp.</i>	6	Mosquito	Diptera	Very Tolerant
3	<i>Mesoveliidae sp.</i>	1	Pondweed Bug	Hemiptera	Moderately Tolerant
3	<i>Sympetrum sp.</i>	1	Dragonfly	Odonata	Moderately Tolerant
4	<i>Culicidae sp.</i>	3	Mosquito	Diptera	Very Tolerant



4	<i>Agabus sp.</i>	1	Water Beetle	Coleoptera	Moderately Tolerant
4	<i>Limnephilidae sp.</i>	1	Caddis Fly	Trichoptera	Moderately Sensitive
4	<i>Asellus aquaticus</i>	1	Freshwater Hoglouse	Isopoda	Very Tolerant
4	<i>Baetidae sp.</i>	3	Mayfly	Ephemeroptera	Moderately Sensitive



1



2

3



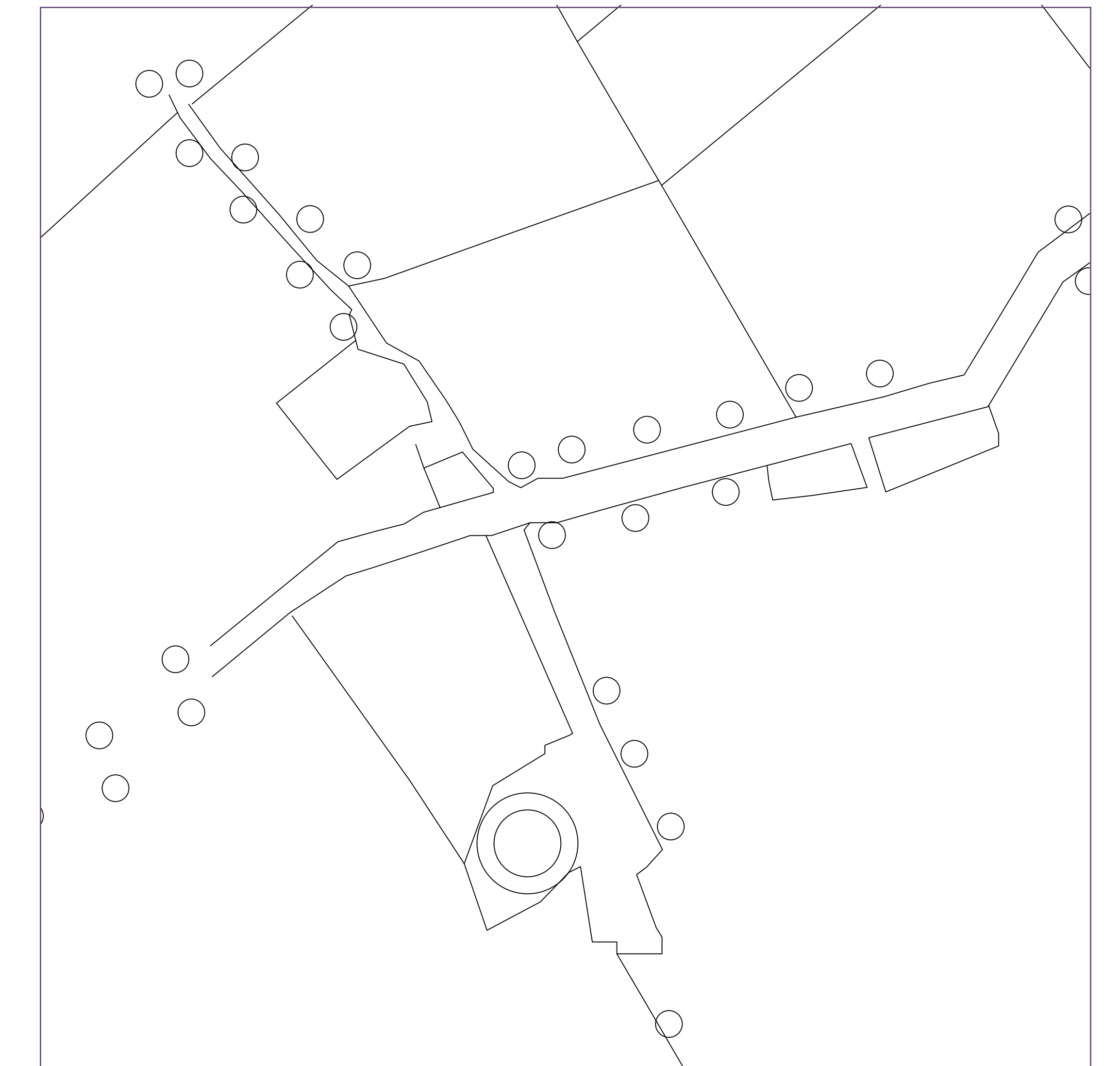
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# Landscape Analysis

## Historical Landscape Analysis

1. OSI 25 inch 1888-1913
2. OSI 6 inch 1837-1845
3. OSI six inch Cassini
4. Spatial, field and drainage pattern surrounding Lough Bracken extracted from 1888-1913 map
5. Spatial, field and drainage pattern surrounding Lough Bracken extracted from 1837 map
6. Trees and field pattern in relation to Lough Bracken Mound 1837
7. Location of boathouse 1888-1913
8. Detail of drainage, hedgerow and treatment of eastern lake shore 1888-1913

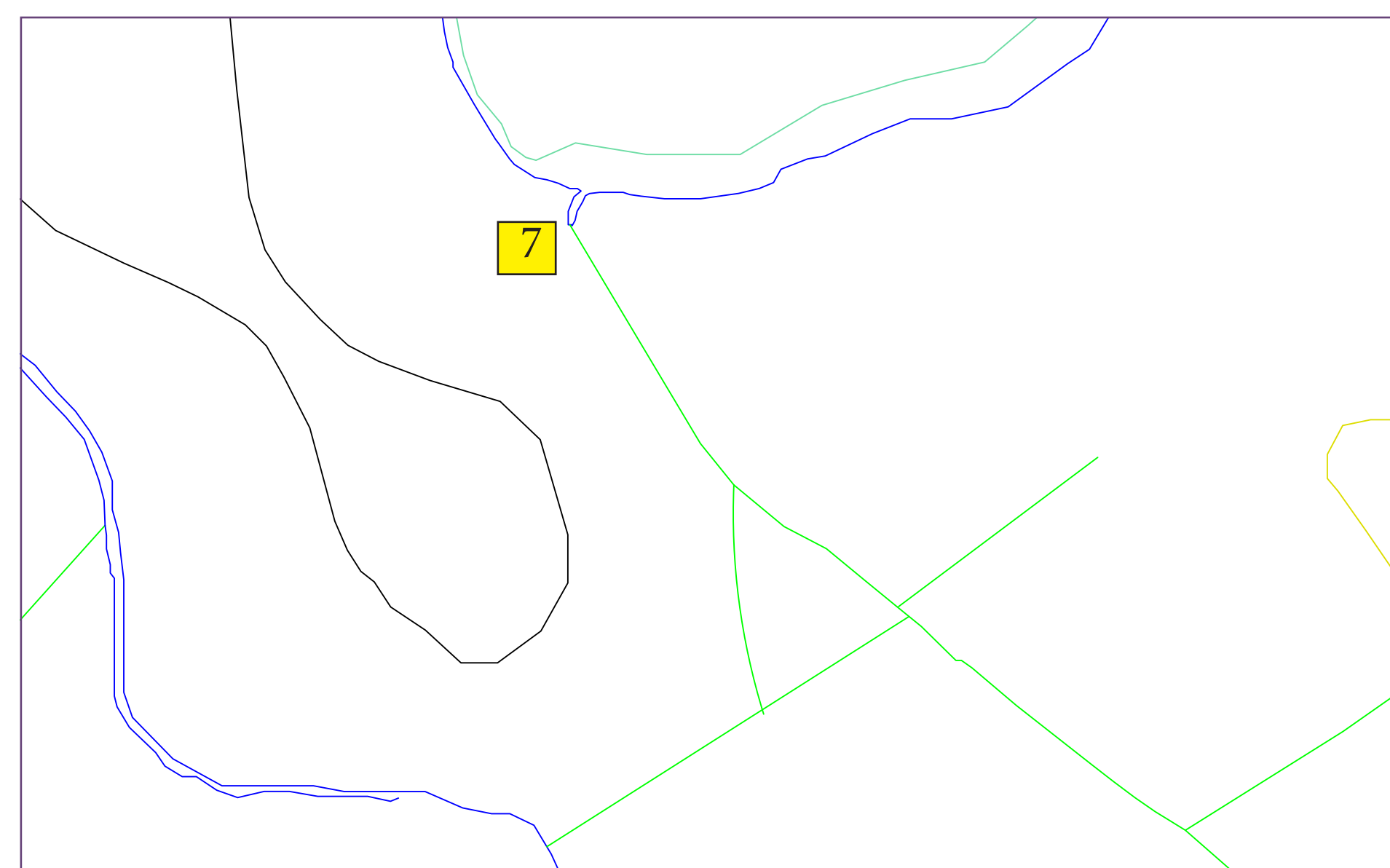
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6

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8



Project; Lough Bracken  
 Client; Flynn Furney for Meath Partnership  
 Drawing; Historical Landscape Analysis  
 Drawing No. ; MLBLMP026A  
 Drawn by; GH  
 Scale : Various and NTS Print A0  
 Date; 22/12/21



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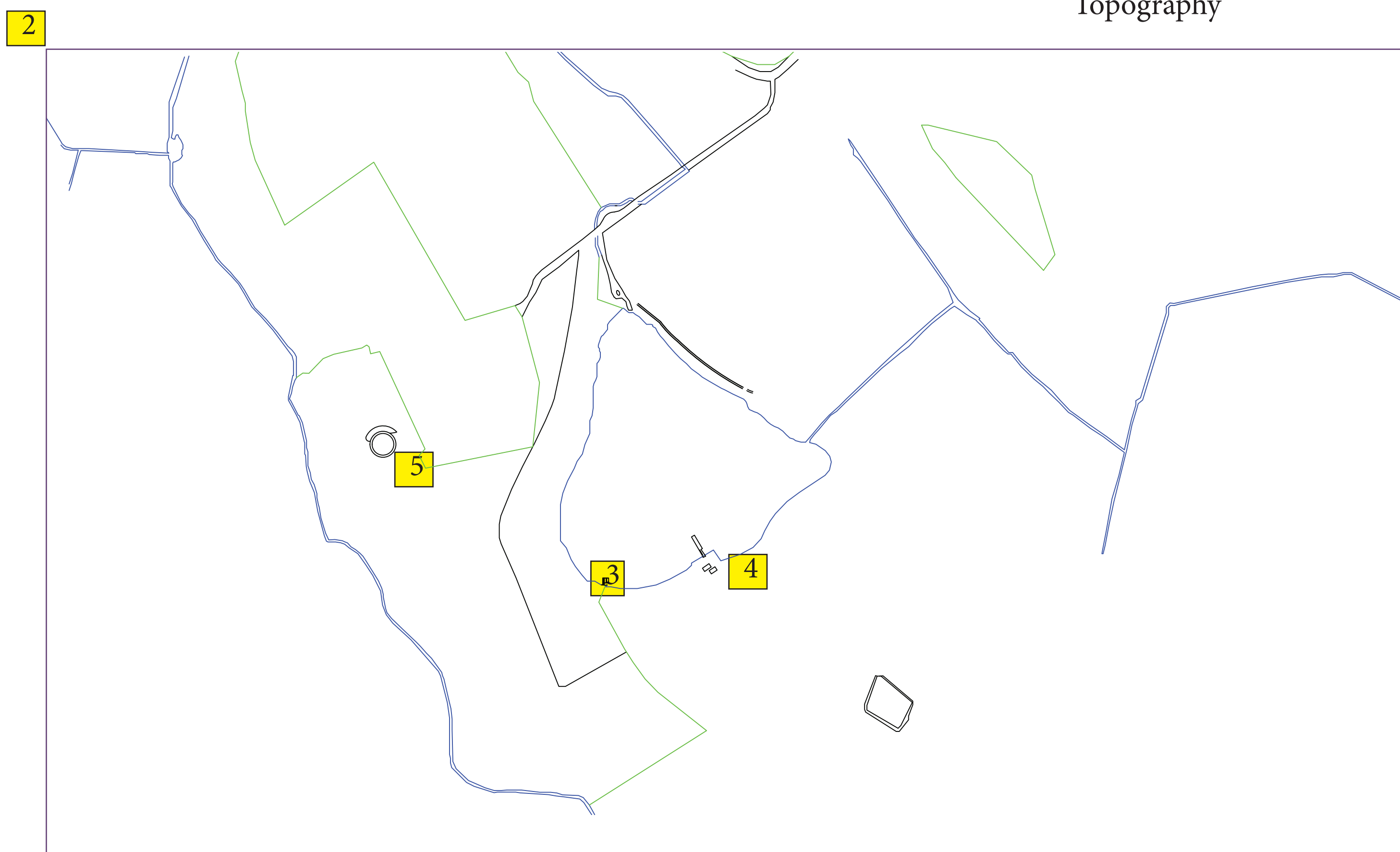
# Landscape Analysis and Design Development



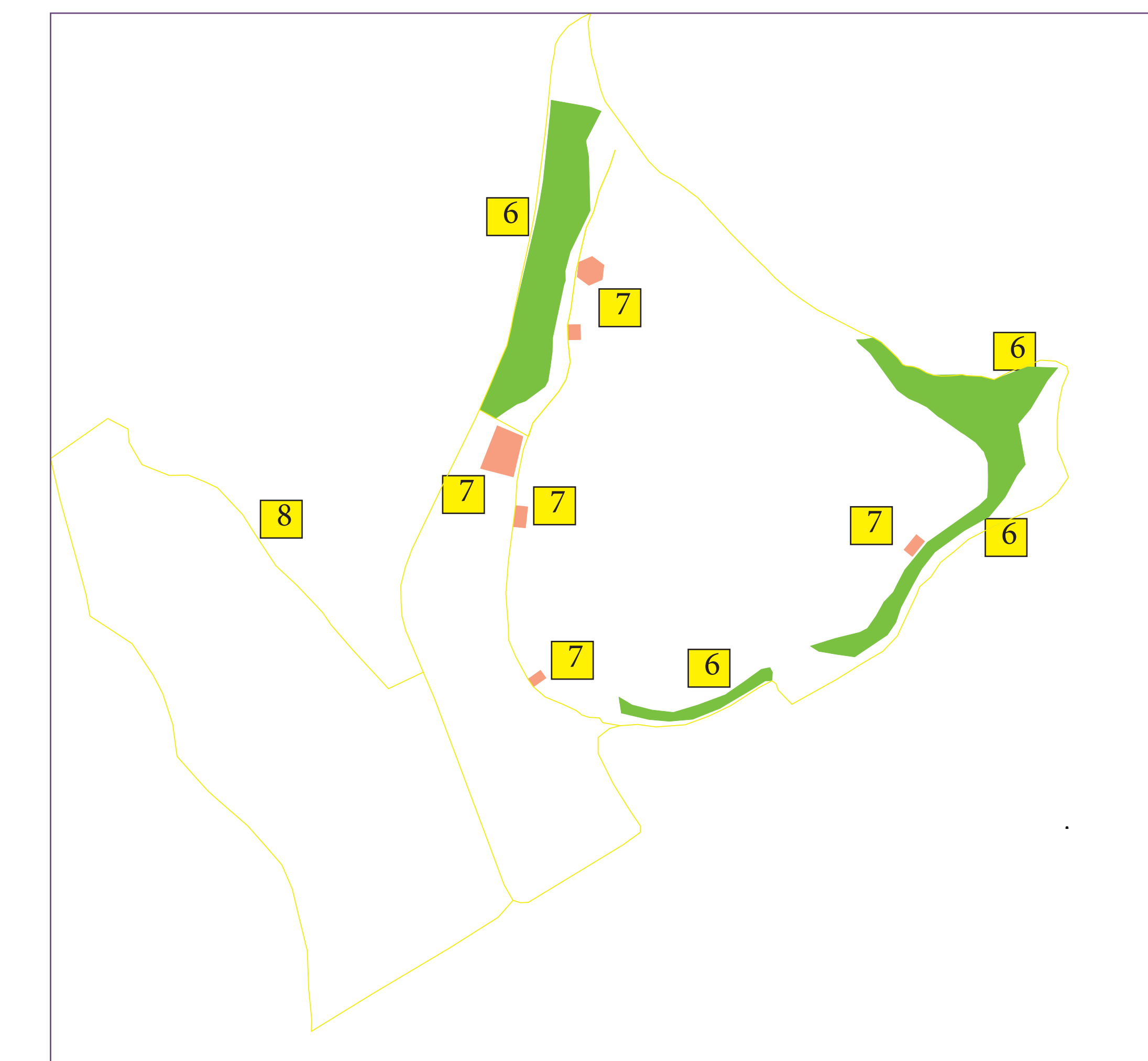
Topography



Ecological study areas in relation to current drainage and field patterns



Field and Drainage Pattern



Ecological Assessment

## Circulation



- Lough Bracken Lake Loop Walk -Challenging Access
- Restricted Vehicular Access
- Lough Bracken Lake Loop Walk - Universal Multi-Access
- Scots Pine /Moat Loop Walk
- Lough Bracken Lake Loop Walk -Fishing Access

1. Topographical pattern falling to Lough Bracken
2. Current spatial pattern surrounding Lough Bracken dictated by the field system, afforestation and the drainage pattern
3. Lough Bracken
4. Water plant
5. Lough Bracken Mound Monument No. Me 006-027
6. Areas identified for ecological enhancement by ecology team.
7. Microsites identified by geolocation
8. Walks identified by ecological team within the site which have ecological, fishing and amenity interest. Some pathways showing wear and or erosion.
9. Positioning of identified walks, areas for ecological enhancement and microsites in relation to current field, forestry and drainage pattern.

A design solution based on the multifaceted use of the lake circulation patterns which allow for the management of recreational users, fishers, families and people of all abilities. Trail loops are designed to accommodate various grades of ability and encourages a wide range of members of the community to enjoy being outdoors and accessing outdoor ecological education in a fun interactive manner. Trail grade designs to be according to the guidelines produced by the Irish Wheelchair Association and Sports Ireland. The use of boardwalks to encourage recreational users and others to follow the assigned trails and to facilitate habitat restoration and prevent lake shore erosion. Forestry trees removed to facilitate woodland boardwalk trails to be replaced by deciduous/ native/ naturalised trees appropriate to soil type and conditions. Habitat restoration, tree species diversity and riparian zone protection and restoration will also contribute to increased water quality at Lough Bracken. By attracting families, accommodating both universal and challenging trail users, anglers and fishers, the bird watching community and nature lovers, maintaining a dawn to dusk opening policy, the area is also protected from anti-social behaviour.

Each stretch of the alignment to have levels taken and trees surveyed before final design detailing.

Project: Lough Bracken  
 Client: Flynn Furney for Meath Partnership  
 Drawing: Landscape Analysis  
 Drawing No. : MLBLMP027A  
 Drawn by: GH  
 Scale : Various, NTS Print A0  
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# Landscape Masterplan

## Legend

1. Entrance from road
2. Removable / collapsible bollards west of the low bridge. Bollards to allow vehicular admittance between dawn and dusk. Bollards to be 1m apart to facilitate universal access when bollards are in situ. Bollards to be of timber construct with non toxic wood treatment.
3. Reversible gate with small extension to tar macadam road to allow disabled access around barrier. Alternatively a disabled access kissing gate of timber construct to be positioned here. The firm base of the extension to be in porous resin bound brown to beige gravel. The sense of entry to the lake and forest complex to be reinforced by a change in road surface colouring using anti-skid warm beige to slow traffic and define the space. The bank of the stream to be repaired and restored and planted with *Betula pendula* (Birch), *Crataegus monogyna* (Hawthorn), *Viburnum opulus* (Guelder rose) and *Rosa canina* (Dogrose). A semicircular arc in front of the planting to be assigned for bicycle parking. This to be composed of a spiral of polished steel, firmly secured for safe parking.
4. Existing car park
5. Boundary of proposed picnic area to be reinstated according to existing field boundary position. Pollinating plants, hazel on drier ground, crab apple trees and wild cherry to surround picnic places and semi-natural damp meadow grasses to form a meadow here. Stone at car park edge to be grouped into naturally appearing assemblages softened by planting and allowing *Filipendula ulmaria* (meadowsweet), *Iris pseudacorus* (yellow flag Iris) and similar to regenerate giving a natural appearance whilst continuing to give effective protection to vegetation from vehicular and pedestrian traffic.
6. A board walk to link the picnic area to a universal compost toilet facility with warm water provided from a roof mounted photovoltaic cell/ solar panel. A sedum mat to constitute a green roof with slight slope adjusted for appropriate drainage.
7. Existing forestry road to be made as safe as possible for wheelchair access to meet universal multi access criteria on the first stretch and challenging access on the latter stretch of the alignment. The grassy median to be trimmed to allow 1m clear unobstructed access on either side of the road.
8. Swimming, viewing, changing, resting node with perched beach and a board walk connection back through the trees to the existing forestry road. This will require the judicious removal of some evergreen forestry trees and their replacement with deciduous / native trees. Slopes along this section to be carefully constructed to ensure there are plenty of rest places and grades do not exceed universal multi access/ challenging access requirements. For multi access the slope will not exceed 1:21 (5%) and will be this grade only for a very short distance. For challenging access the slope will not exceed 1:15 (7%) and will be this grade only for a very short distance.
9. Planting to soften and integrate existing buildings for water infrastructure into the landscape and the hill behind.
10. The lake foreshore to be fenced securely and stock to be watered from a series of movable troughs placed to ensure water quality and protection from poaching.
11. The steep bank of the lake shore to be completely secured using woven Salix (willow) spilling. Erosion and slippage of fine silt and sediment into the lake to be prevented using this bioengineering solution. Fishing stands to be integrated into the spilling and placed frequently to prevent wear and erosion of the bank at fishing locations. This will simultaneously allow for an increased measure of water safety with greater terracing allowing for easier rescue from the water.
12. A woodland walk through Scots pine to circulate through the trees and include Lough Bracken fort in the loop.
13. Circulation to define the use and flow of users around the lake. Along this section a tree root protection system to be put in place for both the construction stage and for footpath usage to prevent compaction and loading of the root system. No more than 200mm of surface soil to be removed and 'no dig' technology to be employed using 10 oz needle punch textile infilled with warm coloured buff locally sourced aggregate. This will suit the variable widths encountered on this section of path where soft soil restrictions will likely be encountered along with seasonal/occasional flooding of the circulation route.
14. Circulation on this section of the alignment to simultaneously address the requirement for universal access to the lake, the need to allow lakeside vegetation to regenerate from erosion due to pedestrian access to the shoreline and increase access to attractive interactive ecological awareness by the proximity of bird hides and resting spots along the alignment.
15. Natural play area integrated into the forestry woodland complex. The play ground to accommodate children of all abilities and encourage physical activity and exercise based on nature play. The equipment to be carefully selected to ensure appropriateness and ensure it visually blends with the forestry/ lake complex. The removal of forestry tree species to be judicious leaving a carefully selected number to lend an adventurous atmosphere to the play ground. The play-ground periphery to be planted with native, naturalised and deciduous species.
16. Artistic use of materials to reflect landscape and sky and screen the reservoir in this prominent location. The commissioning of an art installation will ensure that this prominent feature becomes something beautiful when viewed across the lake.

Project; Lough Bracken  
Client; Flynn Furney for Meath Partnership  
Drawing; Landscape Masterplan  
Drawing No. ; MLBLMP028A  
Drawn by; GH  
Scale ; Print 1:1200@A0  
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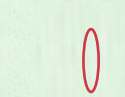
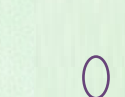
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# Masterplan

## Lough Bracken Zones

- A Entrance Zone and Bicycle Park
- B Parking and Picnic Area with Adjacent Nature Play Areas
- C Universal Access Compost Toilet
- D Universal Access Fishing Stand
- E Swimming, showering and changing area. Transition to woodland hill trail.
- F Bird Hide and Rest Zone
- G Bird Hide and Rest Zone
- H Bird Hide and Rest Zone
- I Challenging fishing area
- J Boat house jetty restoration site- proposed new dipping platform
- K Screening and blending water infrastructure building to landscape.
- L Erosion control: Repair to existing and addition of new fishing stands and fencing bovine herds from direct access to lake.
- M Water troughs at numerous movable locations.
- N Erosion control: Repair and renewal of lake bank, repair and replacement of lakeside hedgerow, provision of connecting pedestrian boardwalk.
- O Erosion control and safety provision. Lake bank repair using willow spiling with an increase in the quality and number of fishing stands and bank strength.
- P Art installation to reflect the landscape and screen the dominant position of the old reservoir.
- Q Trail head information.
- R Trail head information and transition to Scots Pine walk.
- S Moat hide
- T Moat hide and viewing point.

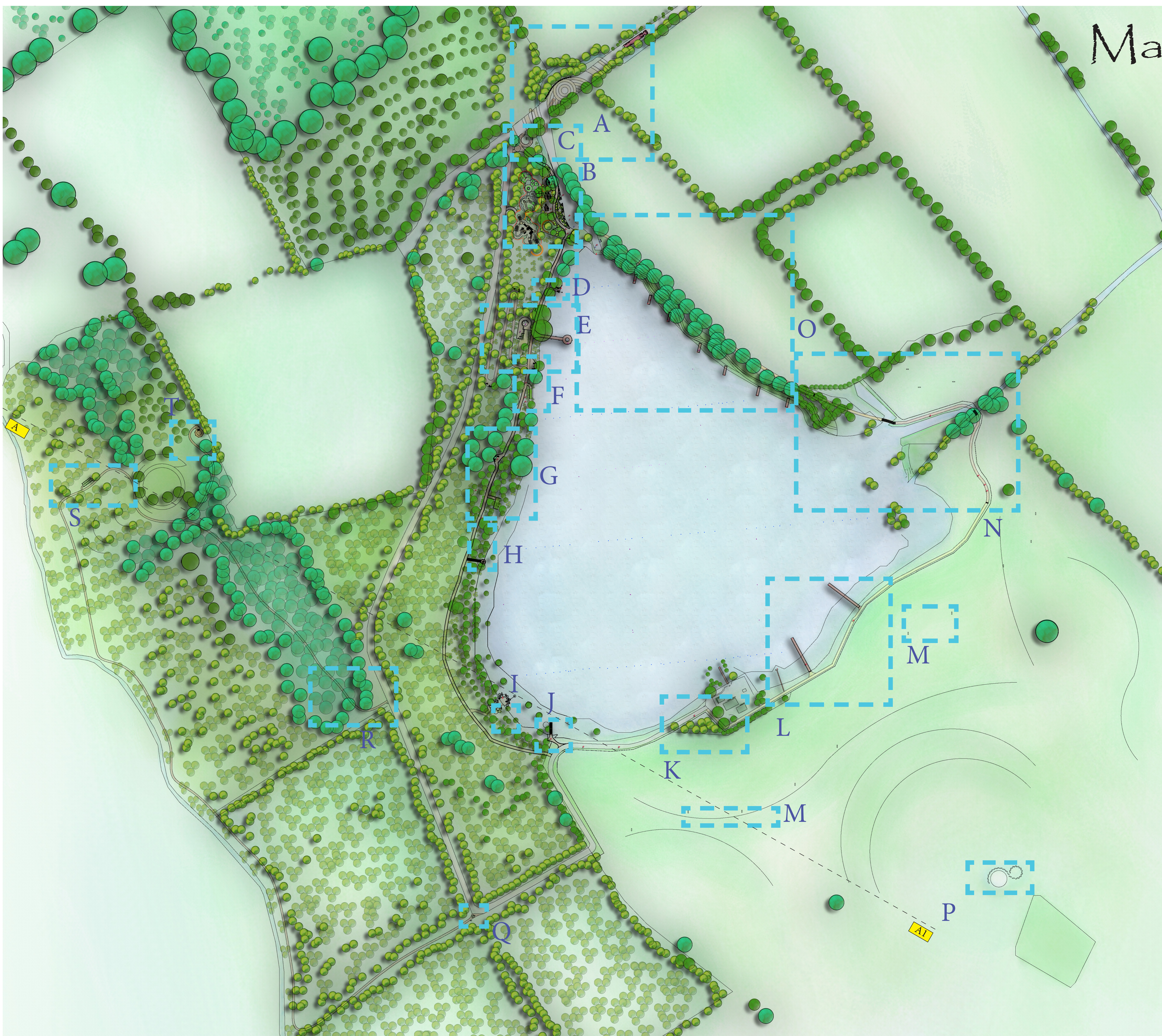
-  Lifebuoy ring
-  Colour coded 100m swimming lengths

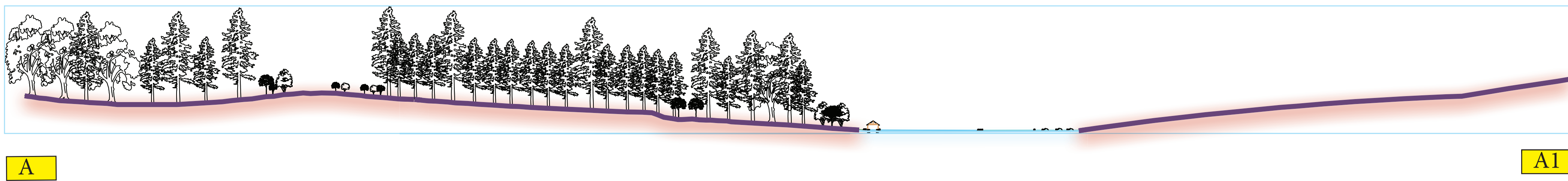
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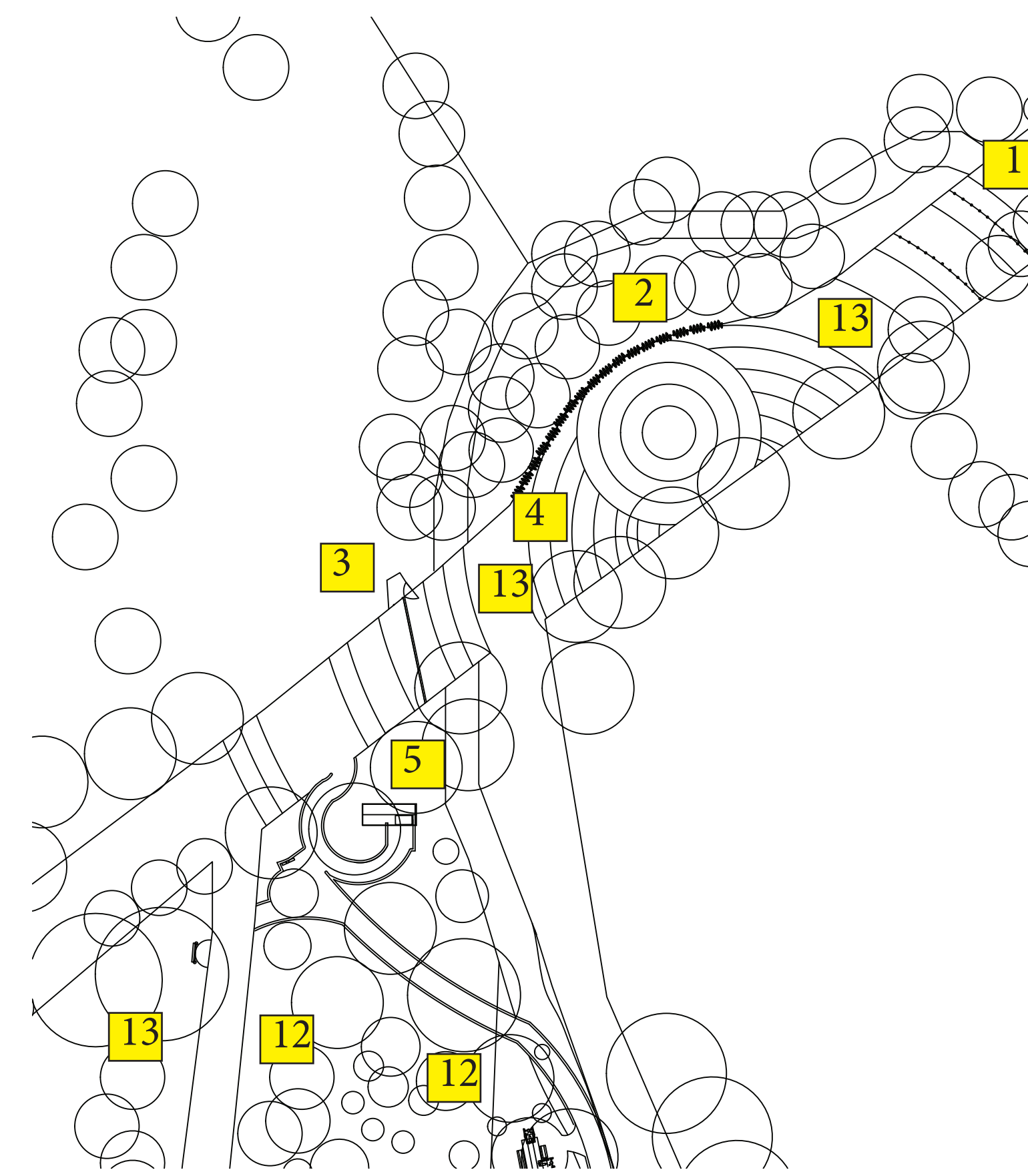
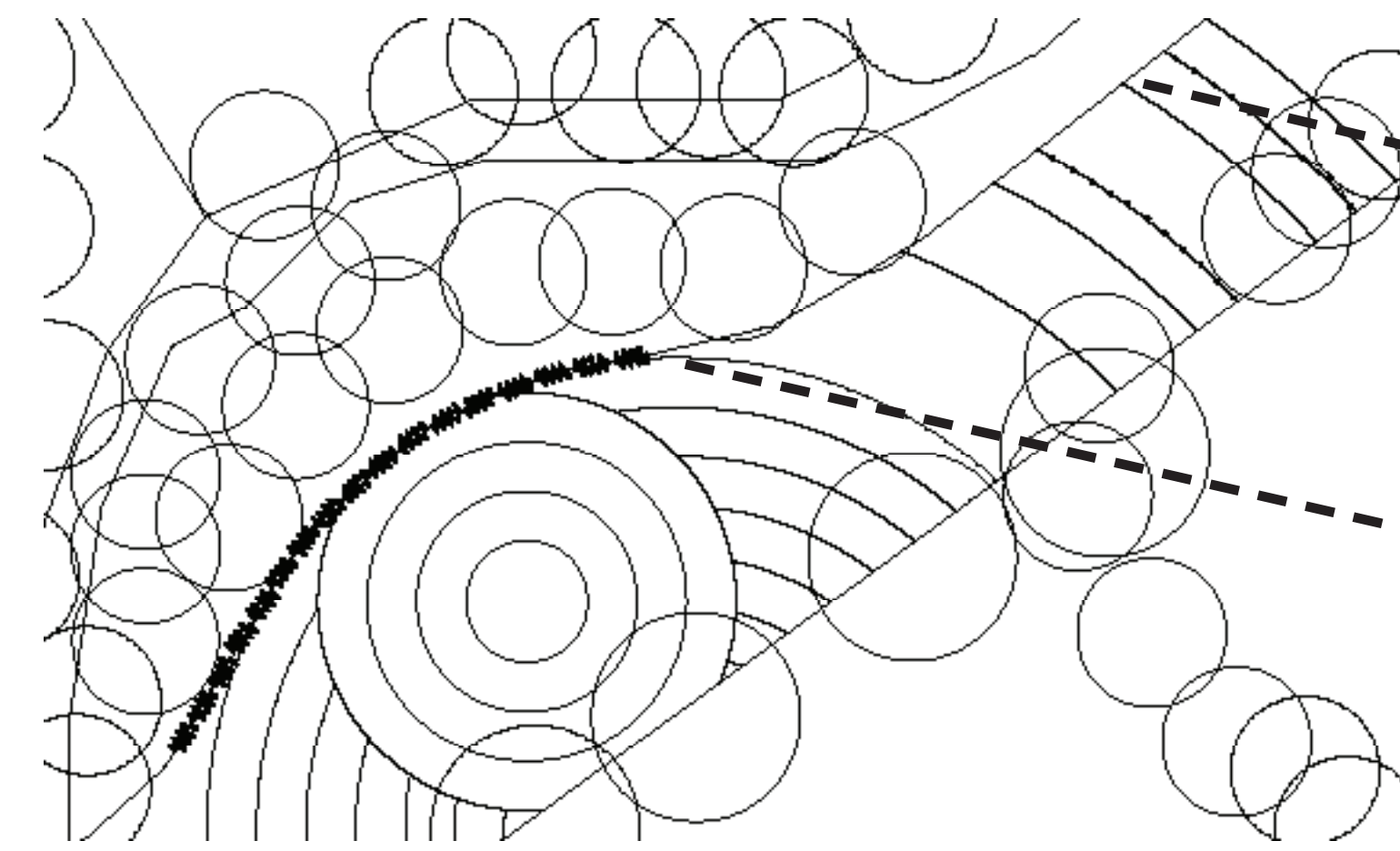
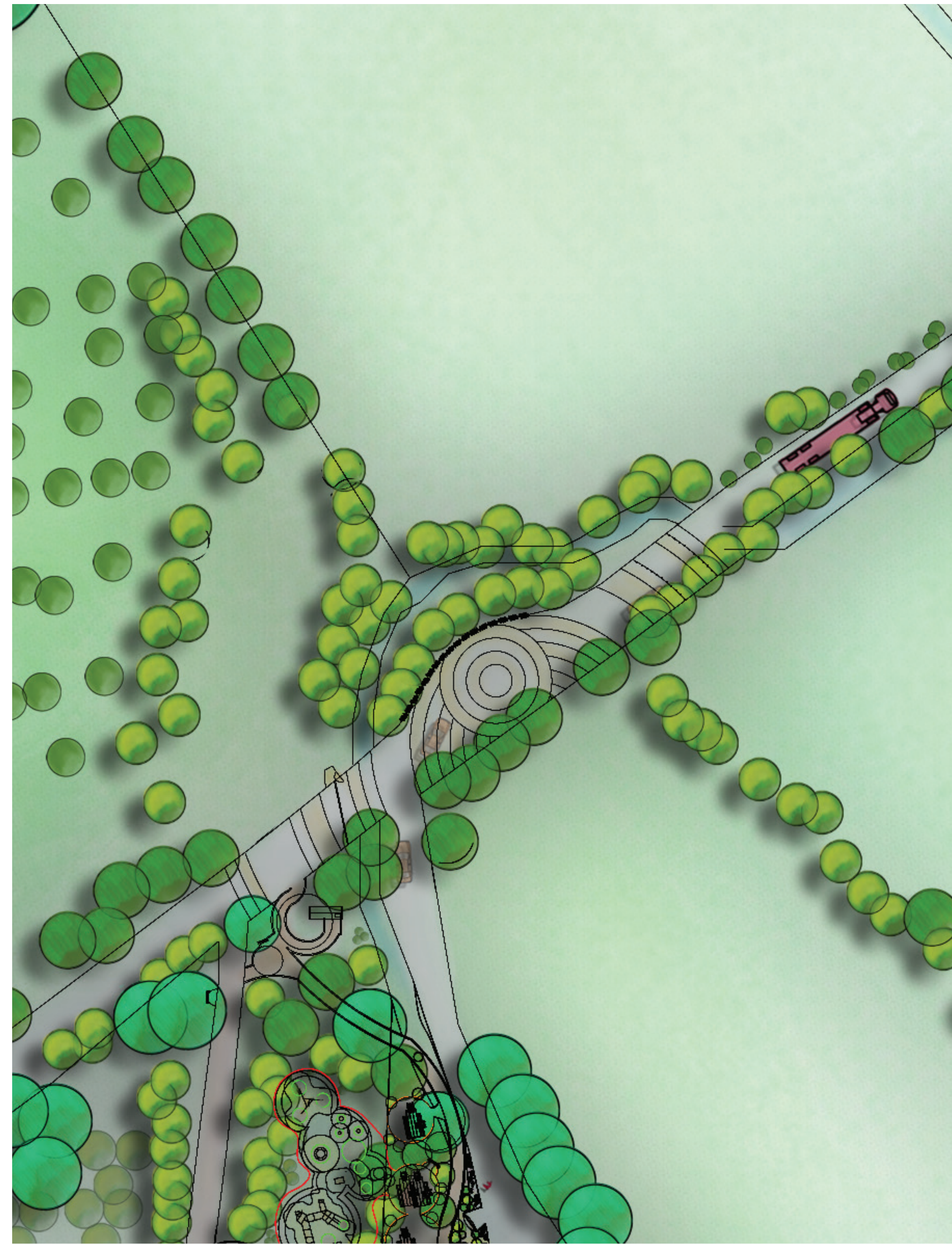




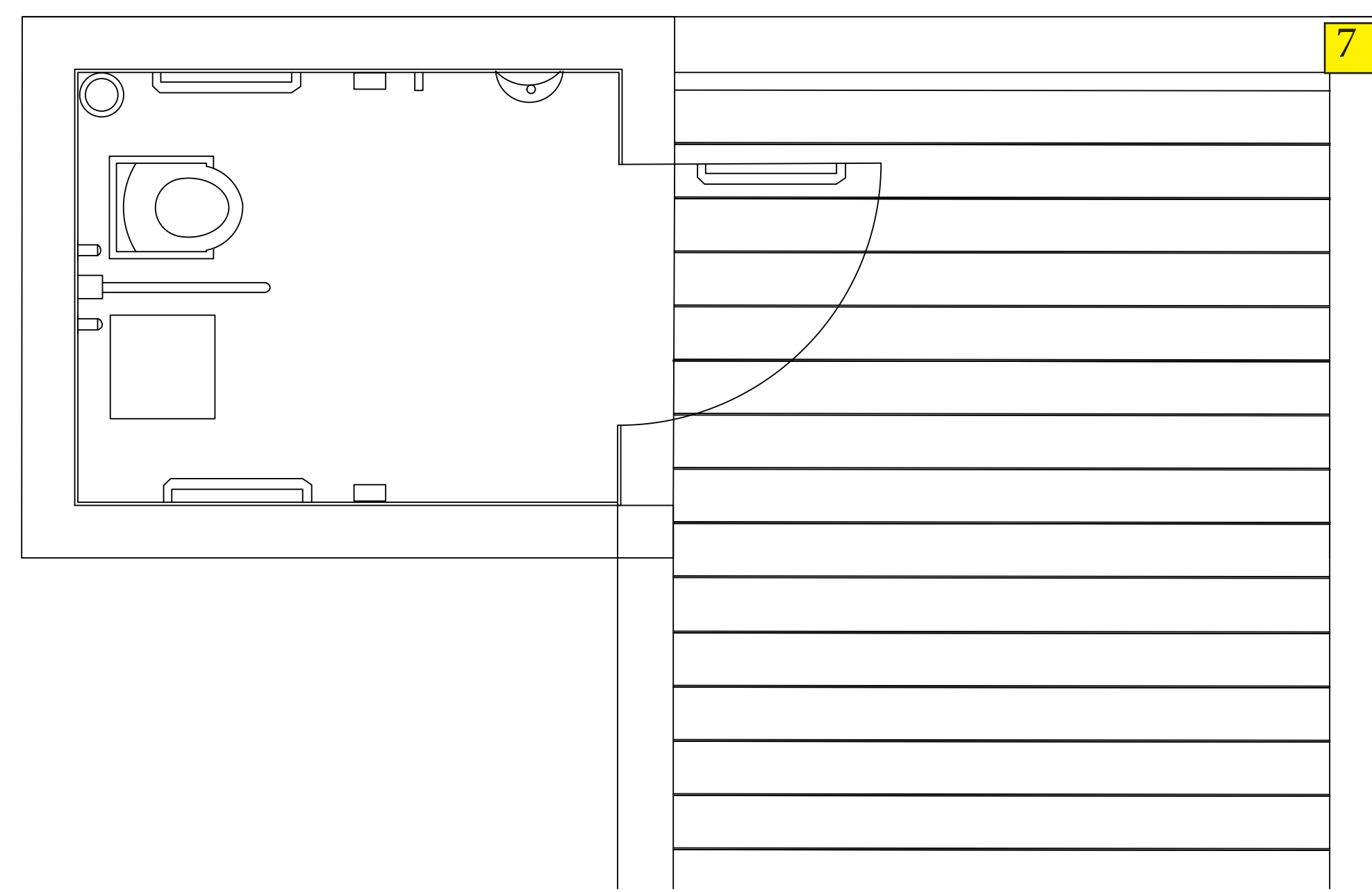
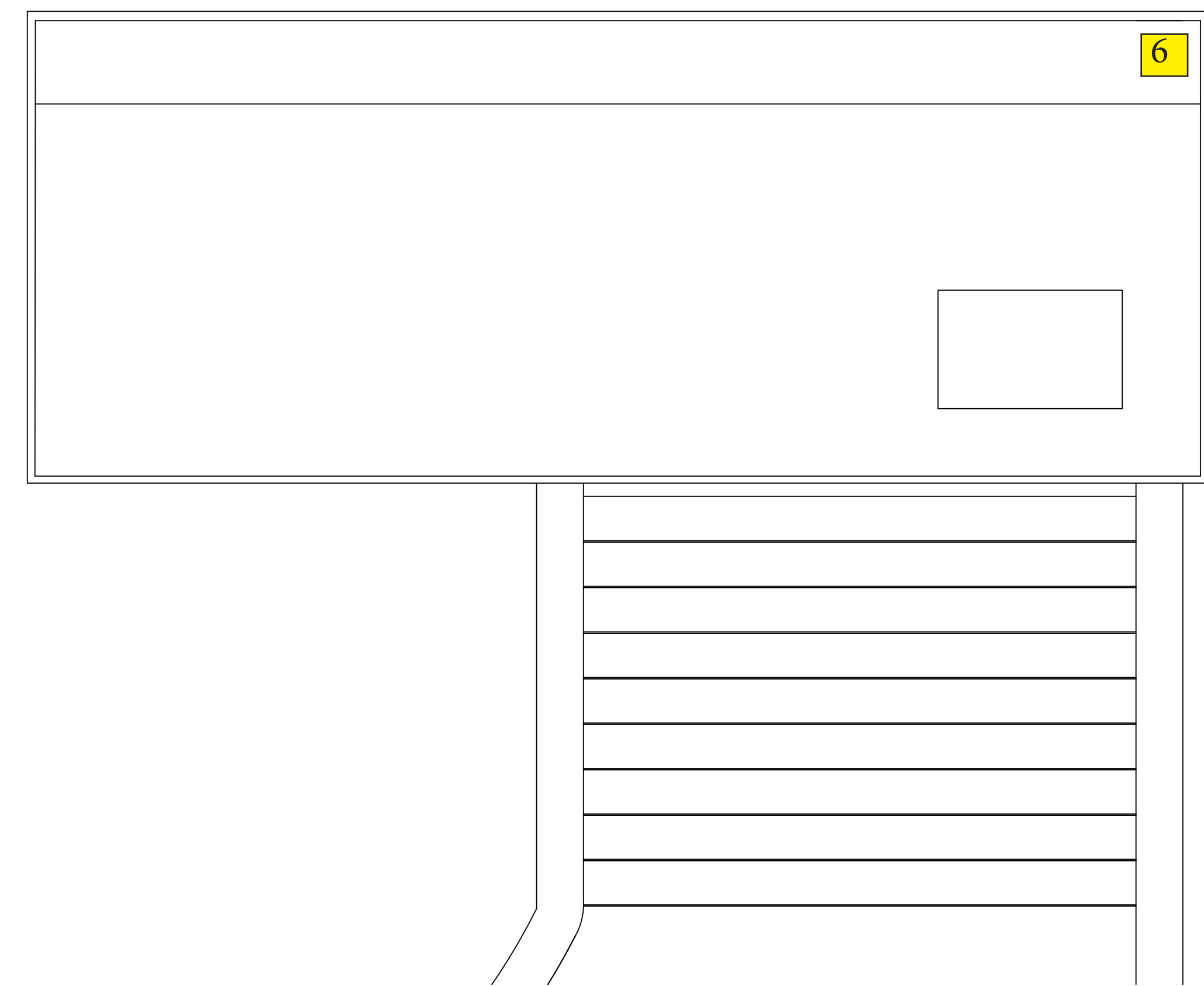
# Landscape Masterplan Section A A1

Draft

# Landscape Plan Zone A, C

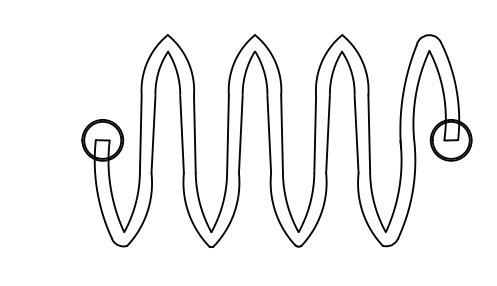
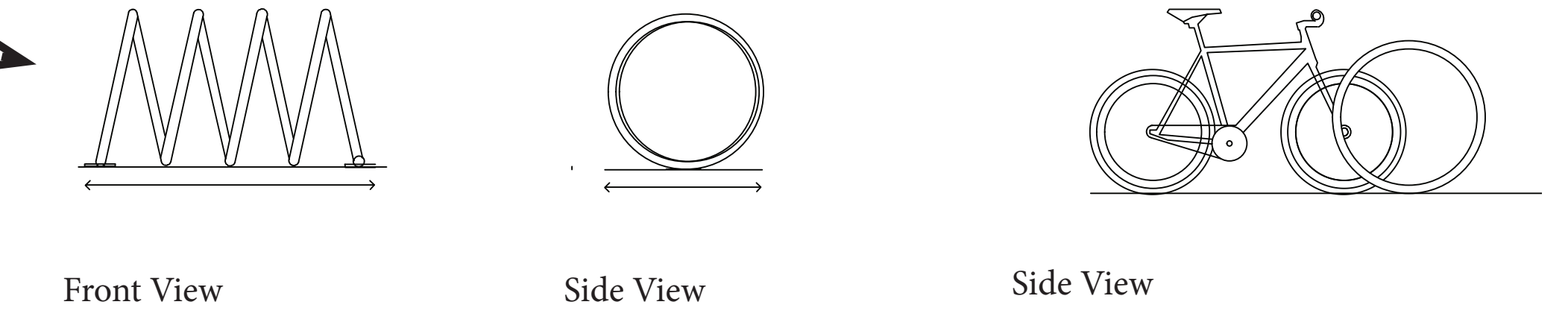


Sedum roof on bird hide below and left, cabin with roof mounted solar panels



## Legend

1. Collapsible/removable timber bollards.
2. Soil contoured and shaped and planted with *Crataegus monogyna*, *Viburnum opulus*, *Betula pendula*, *Rosa canina*, *Alnus glutinosa*.
3. Two way gate system around barrier to provide access for wheelchair users. A firm smooth surface to extend from tar macadam forestry road to be of resin bound beige gravel, porous and with associated drainage around gate to mark the entry and exit point and provide easy access to trail route. Gate to be locked between dusk and dawn. Alternatively a disabled access kissing gate to allow entry at this point.



4. Bicycle park and rack. This will allow bicycles to be secured safely and remove the threat of them as trip hazards or obstacles for disabled users. It will also help reduce possible erosion due to wear on certain popular sites around the lake.

5. Universal access compost toilet located conveniently adjacent to forest road and connecting by an accessible board walk to the picnic area.

6. Compost toilet roof plan with sedum mat and roof mounted solar panel providing warm water for hand washing.

7. Universal access compost toilet floor plan similar to those constructed by Natsol. Dry composting using wood shavings to a vault chamber with vent pipe. Fully accessible ceramic urinal also to be provided. Grab rails, anti scald tap settings, door handles etc to be to universal access standard. Level entry from board walk with turning space.

8. Boardwalk connection to forestry road

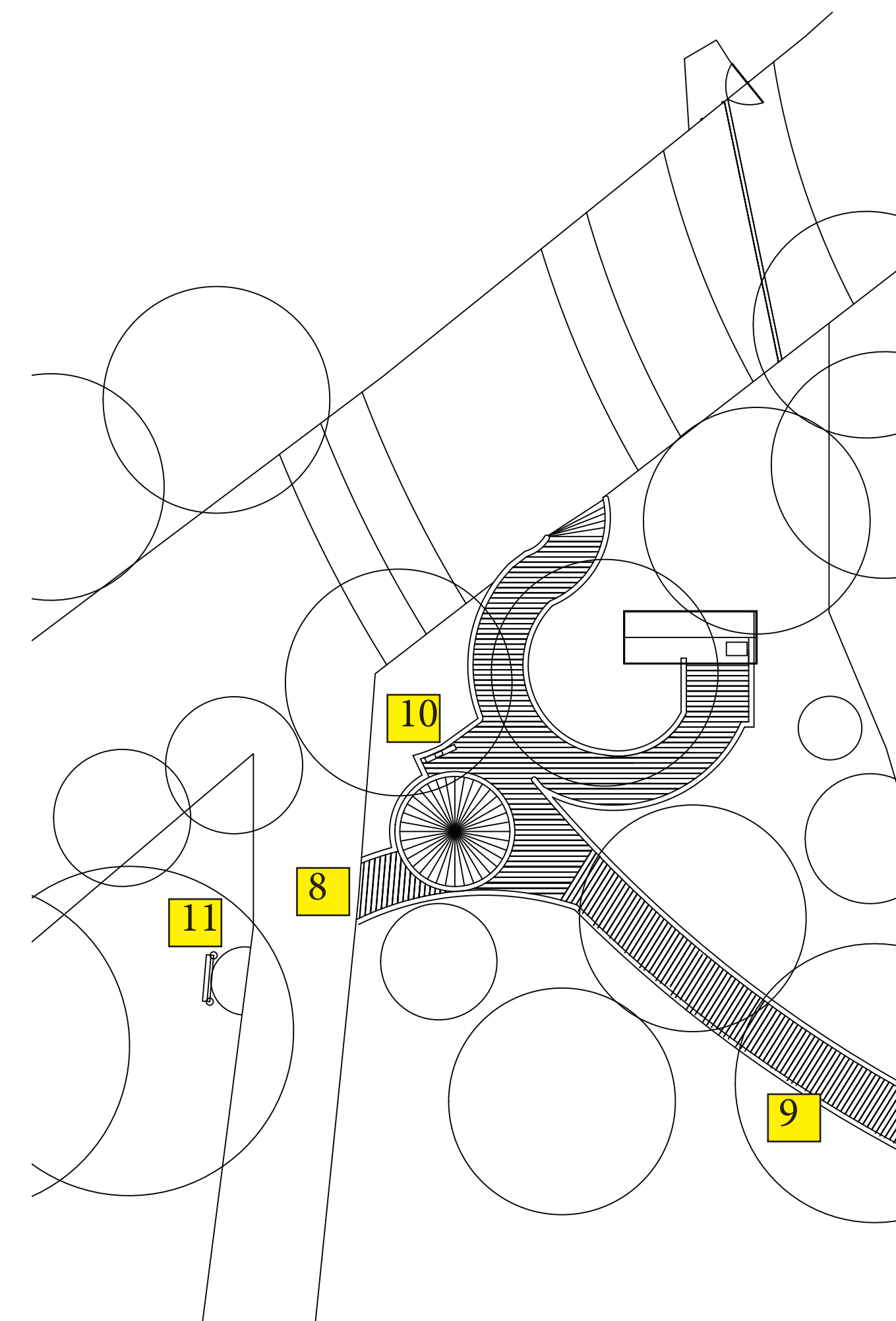
9. Boardwalk connection to picnic area

10. Accessible information board with tactile information for visually impaired visitors.

11. Trail head information including the as built trail grade, slopes, length of slopes encountered, loop distance and connection to other circulation routes. This information also to be in tactile format.

12. Reinforce tree planting with native/deciduous species. *Quercus robur*, *Q.petraea*, *Fagus sylvatica*, using *Ilex aquifolium* and *Corylus avellana* as understory with *Sambucus nigra* as an edge species.

13. Beige anti-skid layer over tar macadam to define entry zone, create a sense of entry and to slow vehicular traffic entering the lake and forestry complex.



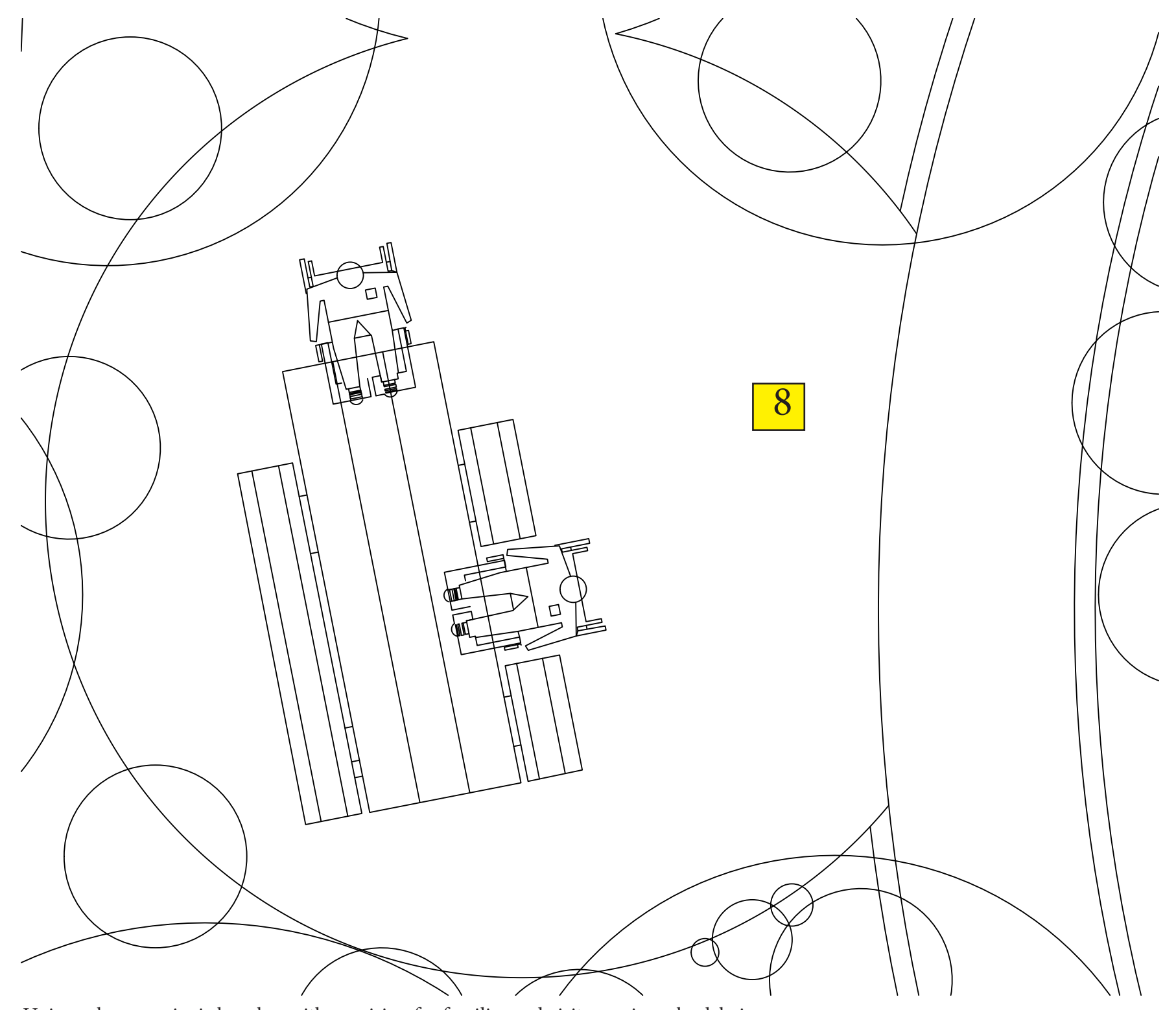
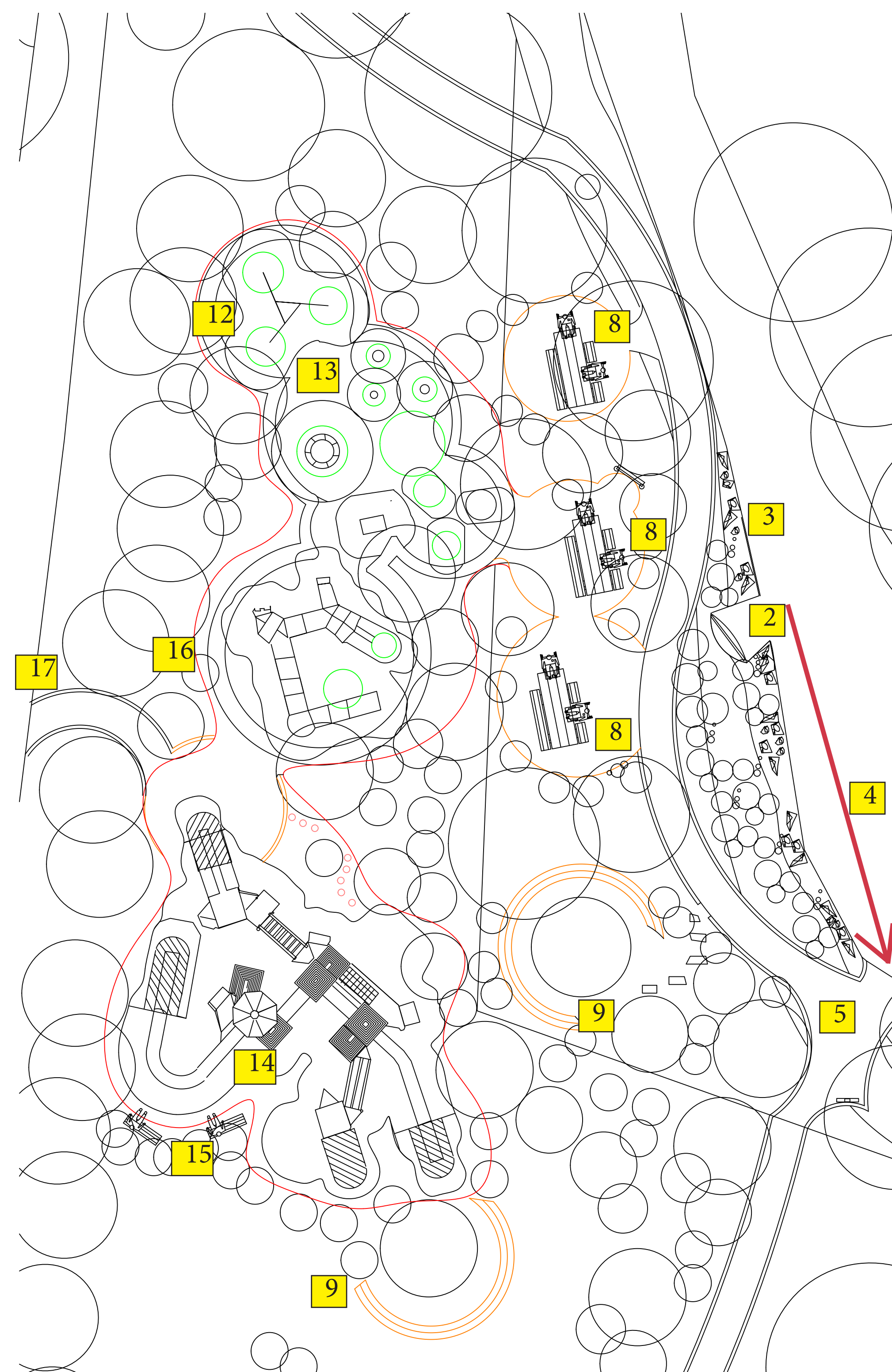
Project: Lough Bracken  
 Client: Flynn Furney for Meath Partnership  
 Drawing: Landscape Section, Masterplan detail Zone A Zone C  
 Drawing No. ; MLBLMP030A  
 Drawn by: GH  
 Scale : Various 1:100, 1: 50 1: 200 NTS @A0



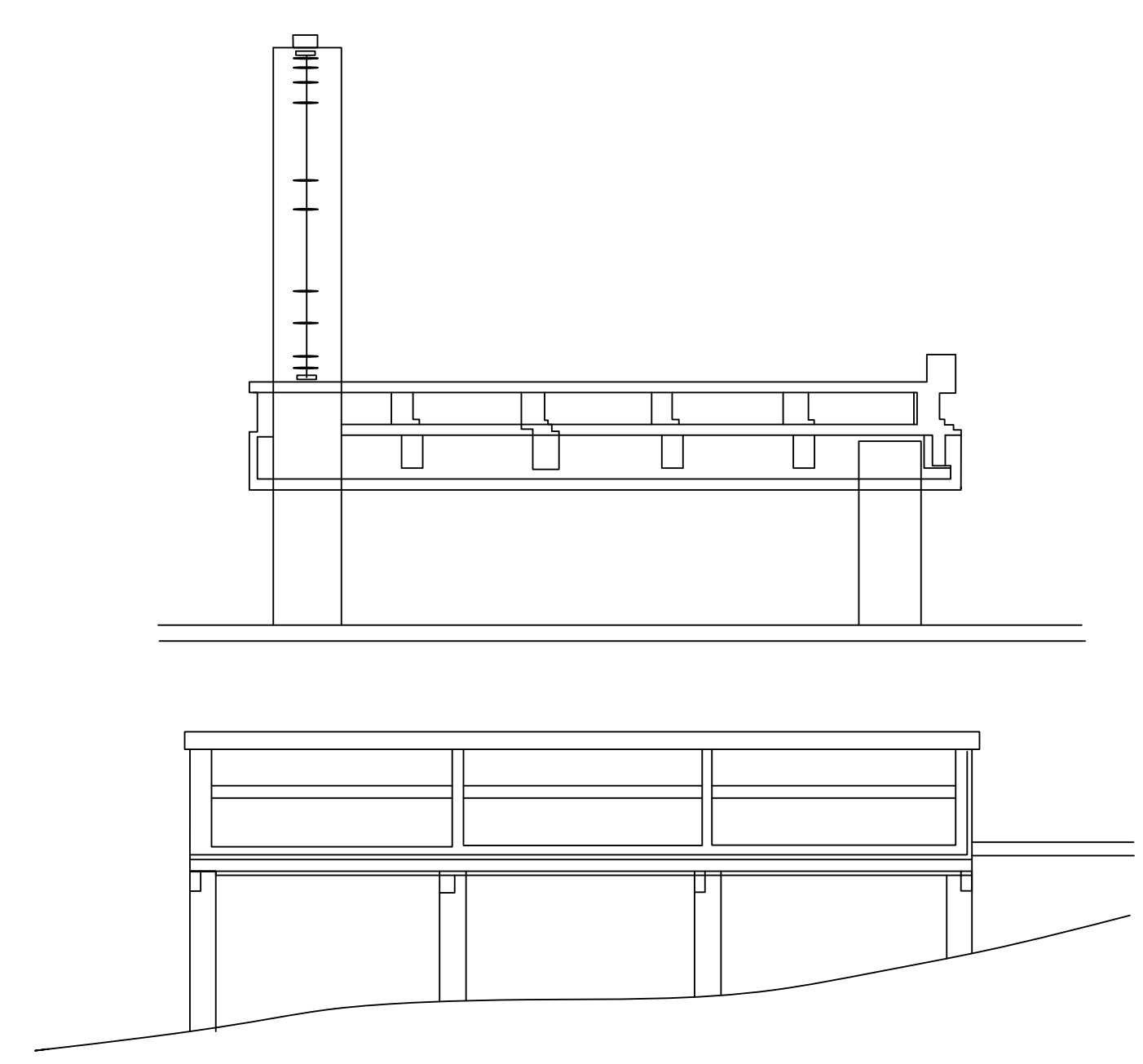
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## Zone B



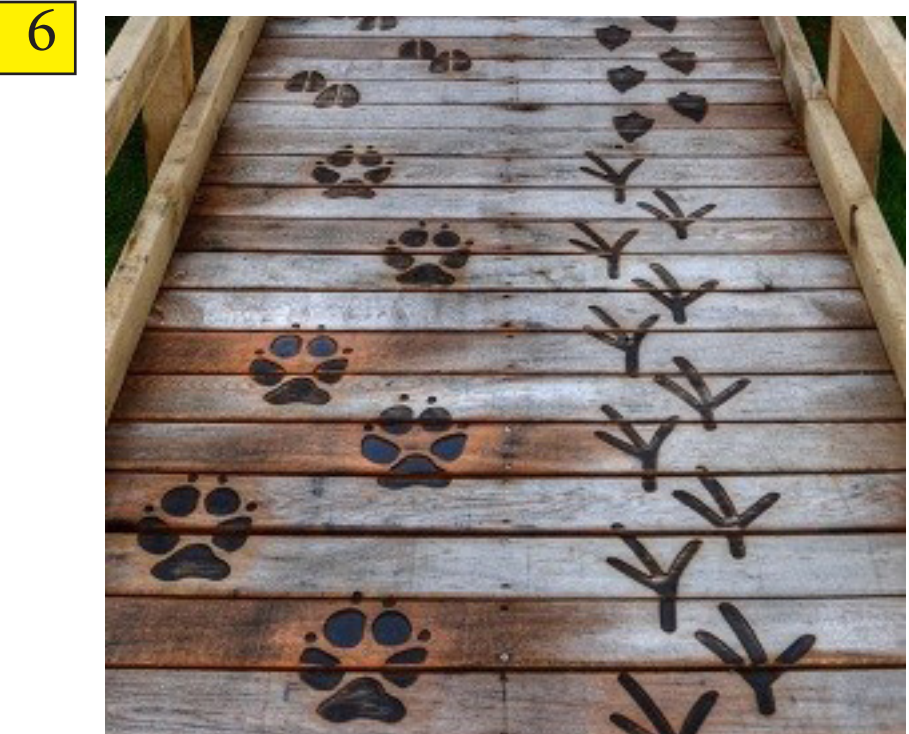
Universal access picnic benches with provision for families and visitors using wheelchairs



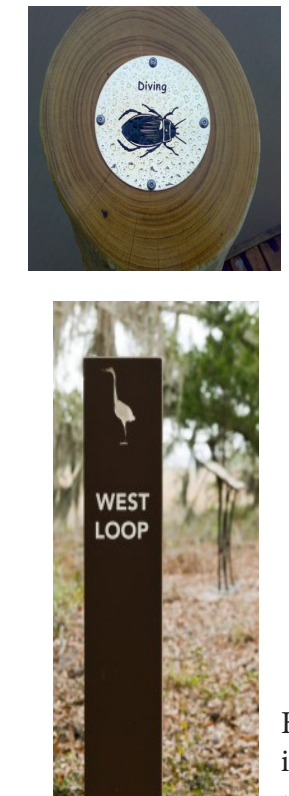
Typical plan and section boardwalk detail traversing uneven ground. The space between the boards to be no greater than 6mm for universal access.



Split log seating arrangement



Habitat information can also be integrated into boardwalk floor



Boardwalk wide enough for wheelchairs to pass with habitat information carried on handrails. Tipping board for visually impaired and to prevent wheel escape at the board edge to be minimum 150mm high. Riparian vegetation to be allowed to renew itself beneath the board. Boards to be 600mm over water where such exists along the alignment.



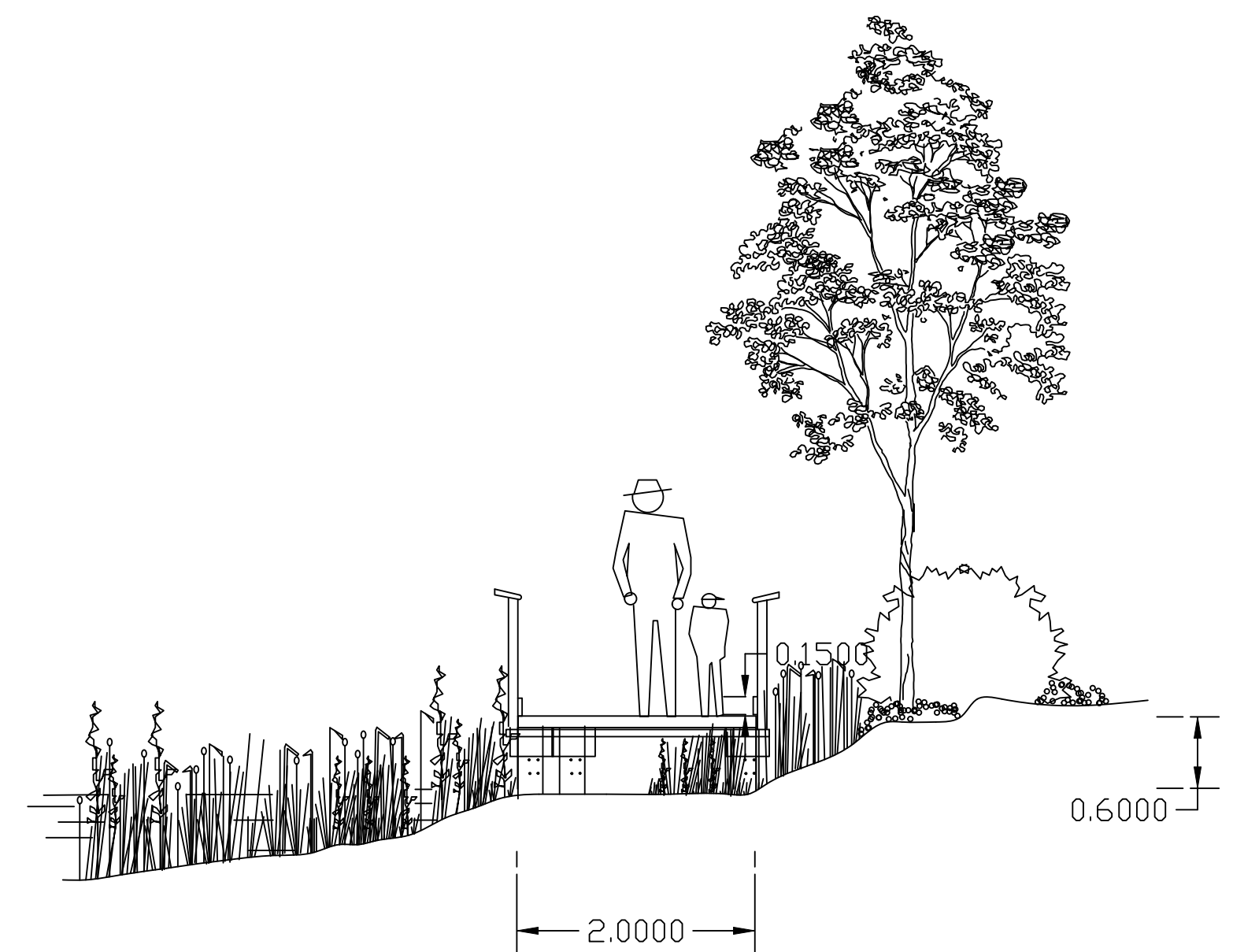
Habitat information at appropriate locations integrated into wooden surfaces in a sustainable, durable and artistic manner. Information including tactile communication to avail of the extensive lengths of handrails. Etching to be clear and attractive.



# Landscape Plan Zone B, D

## Legend

- Existing car park with designated disabled parking areas to ensure ease of access to proposed boardwalks.
- Clear information on the lake and forestry complex, advising on attractions and accessibility of all trails, the challenges and interest of each loop. The information to be presented at a height that is universally legible and with tactile descriptions for visually impaired visitors. This main information board to be recessed to allow wheelchair users to access the information comfortably.
- Existing stone edge to car park to be rearranged to provide a more natural appearance with stone of various sizes regrouped in sets of three or five. Narrow margin of grass to the edge of the car park to be maintained as mown during the summer months with the vegetation to the rear of the stone groupings to be allowed to regenerate. Additional planting of *Iris pseudoacorus* propagated from adjacent stock with all propagation license conditions if required adhered to. Plants to be at least to a 2L specification at planting into suitable ground conditions. *Filipendula ulmaria*, *Myosotis*, *Liatris* or similar encouraged. Rushes to be topped in August if control required. *Dryopteris* (Bracken) to be bruised late in the season if control is required. Bramble to be controlled in a timely fashion as for semi-natural grasslands. Late mowing in August or September if required to maximise pollination potential of flowering plant species and grasses.
- View through trees to hill across lake to be maintained.
- Boardwalk to replace all other routes to the lake. This to be completely accessible with anti-slip surface treatment to boards. Areas liable to occasional flooding to be composed of durable modified wood, non toxic and slip resistant or recycled plastic materials with comparable properties. The board walk to be managed to ensure it is kept clear of debris, growth from beneath or overhanging branches. Recreational users encouraged to utilise the prescribed trails to prevent vegetative wear and soil erosion to areas outside designated trails. Plant life encouraged beneath the boardwalk but managed so as not to encroach above the boards. Existing trees and vegetation to be protected during construction by avoiding any loading or trenching of root zone. Air spades and tunneling utilised where necessary. Piles to be placed to avoid damage to main trees. Boardwalk to be 2000mm wide to ensure comfortable passage of wheelchairs / pushchairs / strollers. The boardwalk to be 600mm over known water mark. A toe board or tipping rail of at least 150mm to extend the length of the boardwalk alignment for visually impaired users and to prevent wheel slippage at boardwalk edge. Hand rails to be broadened at specific sites to give habitat information both visually and in tactile format. This to be connected to a mobile phone application to add acoustic or visual detail. Crown raising along the alignment where required to ensure there are no obstacles to circulation.
- All habitat information to be integrated into the boardwalk apparatus including the hand rail. Creative use of etching and carving to embody the art work into the timber surface. Tactile information to be provided for visually disabled visitors. Information placed at appropriate locations. This will reduce the visual clutter and necessity to install information boards in an ad hoc manner post construction or in the future.
- The board walk to assist with the regeneration of riparian vegetation near the lake shore whilst allowing recreational access to the lake. The boardwalk will also reduce compaction due to pedestrian traffic and ensure dogs are kept on a lead away from lake shore nesting sites. Riparian vegetation plays an important role in water quality in the lake. The boardwalk also enables all visitors to travel safely over water bodies with a recommendation of boardwalk placement 600mm over water surface.
- Defined picnic area with benches to enable wheelchair access. The surface of the picnic areas to be constructed similarly to the boardwalk. Defined picnic areas ensures there is no wear on surrounding vegetation, exposure of soil or risk of silt escape towards the lake.
- Simple split log seating to facilitate and enclose seating in a circular space. The inside of the space to be mown in summer with the grasses, foliage and wildflowers surrounding the split log seating to be allowed to maximise pollinating potential with a late mowing recommendation and treated as for a semi natural grassland system. Centrally planted clear stem *Sorbus aucuparia*, *Malus sylvestris* or sps. as soil moisture conditions allow with protective timber guard rail to further define the space.
- Universal access fishing stand to complement or replace existing fishing stands at or near this location. Fishing stands to have rod stands, arm rests, tackle box shelf and full turning space with safer toe board / tipping rail height over water.
- Accessible level from boardwalk to fishing stand.
- Nature based play area with universal access
- Soft rubber surface specified for play areas with universal ability to negotiate the play space.
- Nature based Norman Castle themed play system to be visually integrated into forest woodland.
- Additional timber benches with view into play space.
- Boundary of play area defined with easy close gates separating picnic area from play space. Gates to be opened from dawn until dusk. Pets to be confined outside of the play boundary.
- New connection to forest road



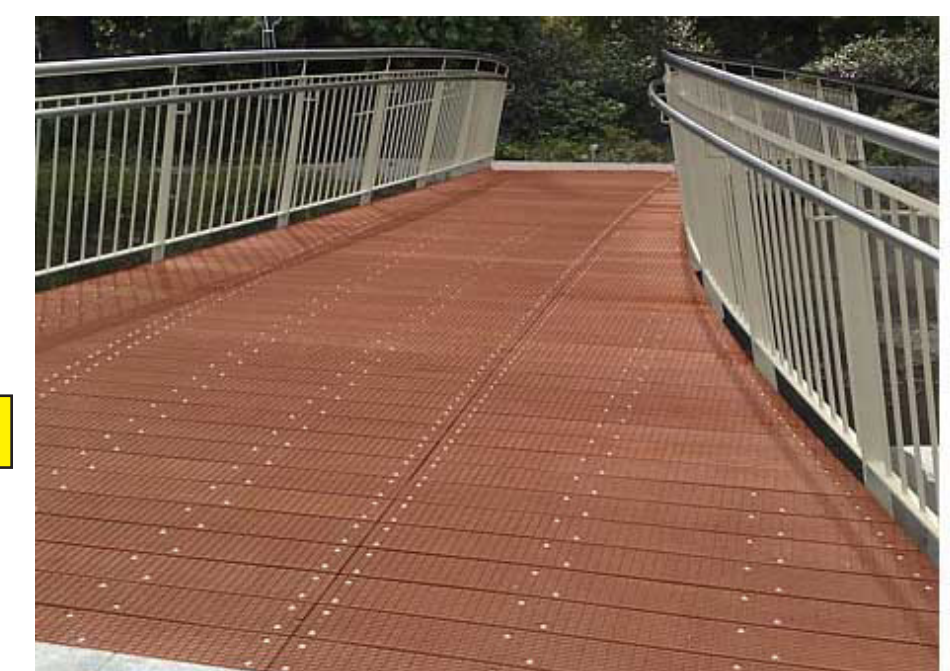
Boardwalk over a water body composed of recycled plastic materials



Information integrated into the boardwalk to reduce the necessity for additional signage



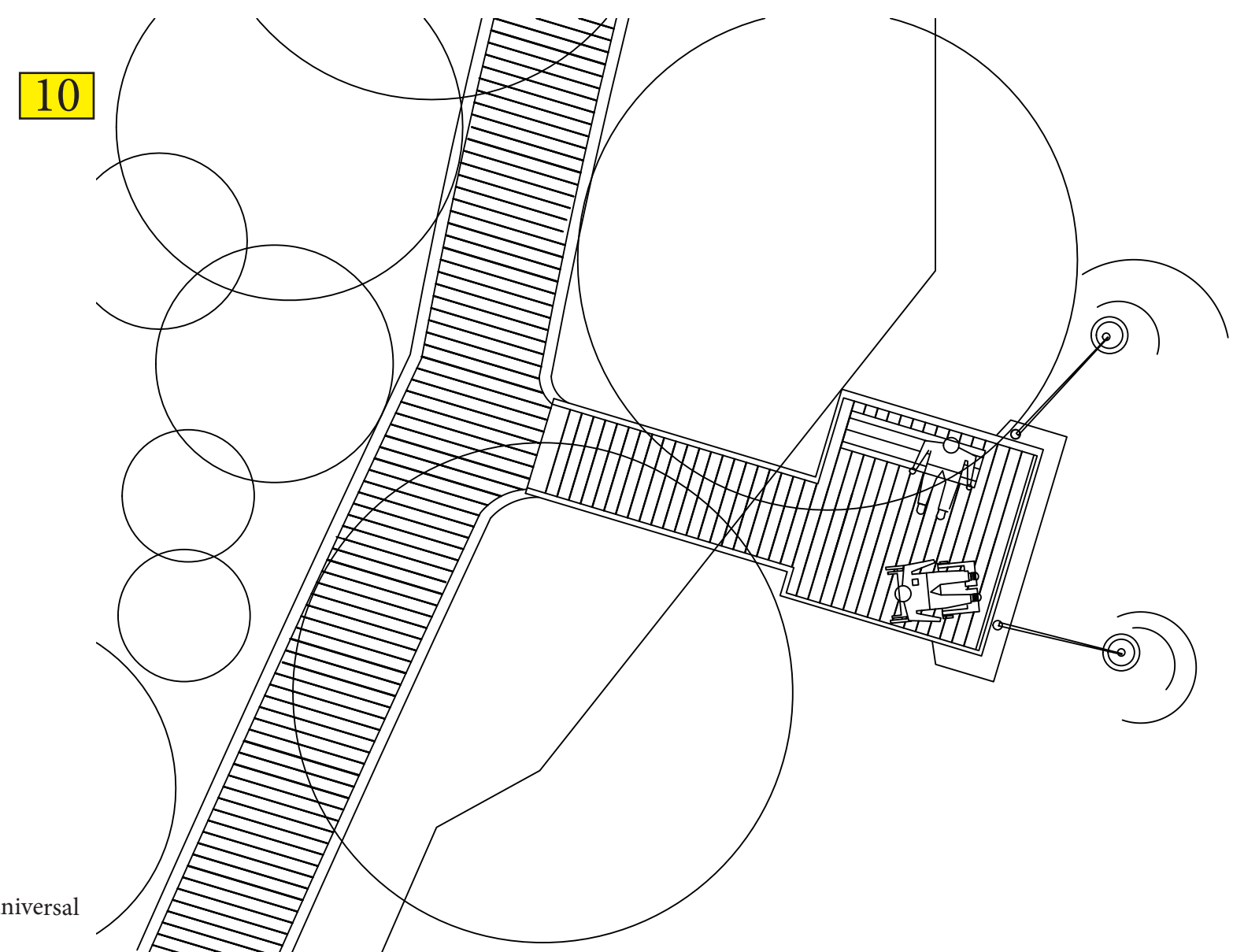
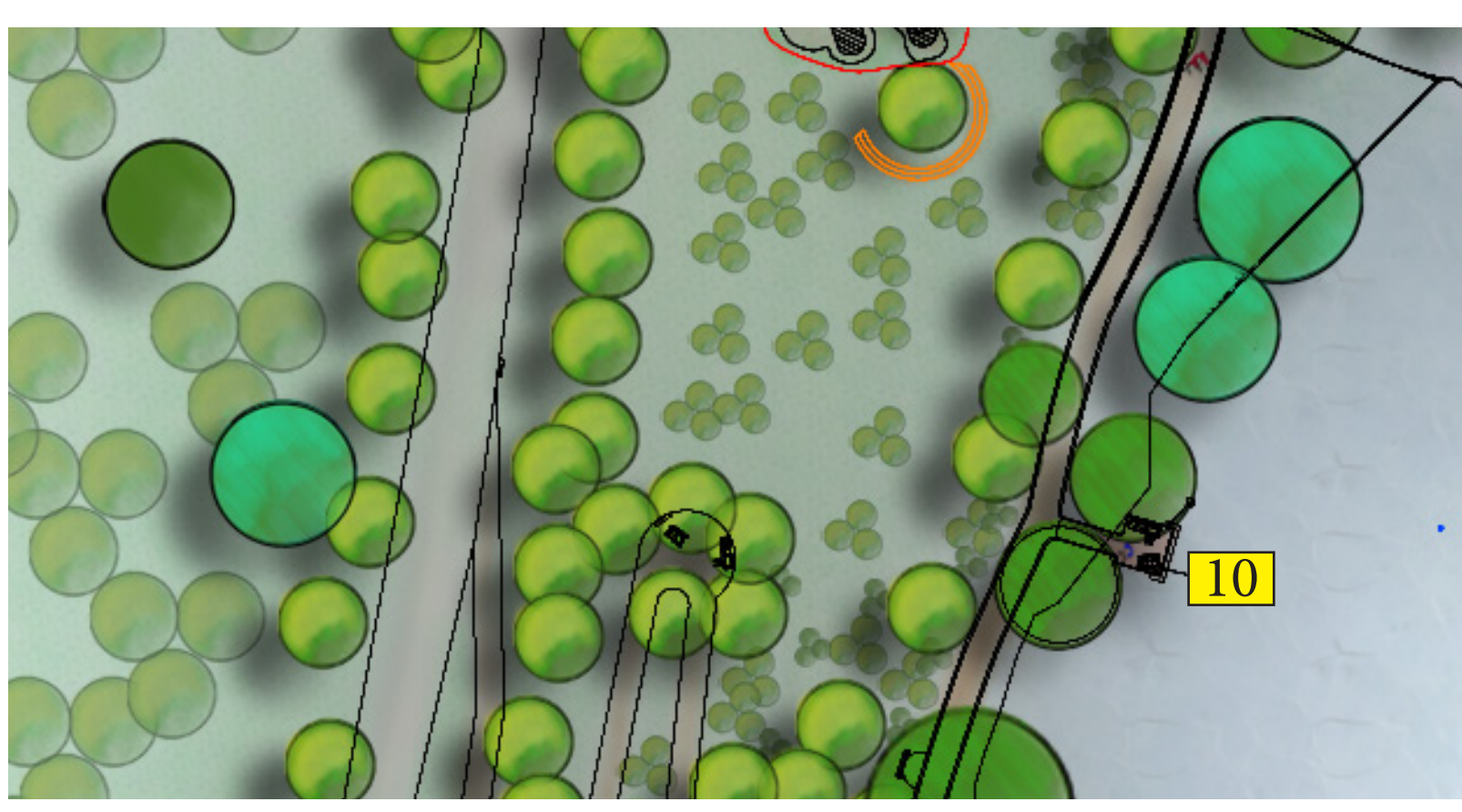
Example of an accessible fishing stand



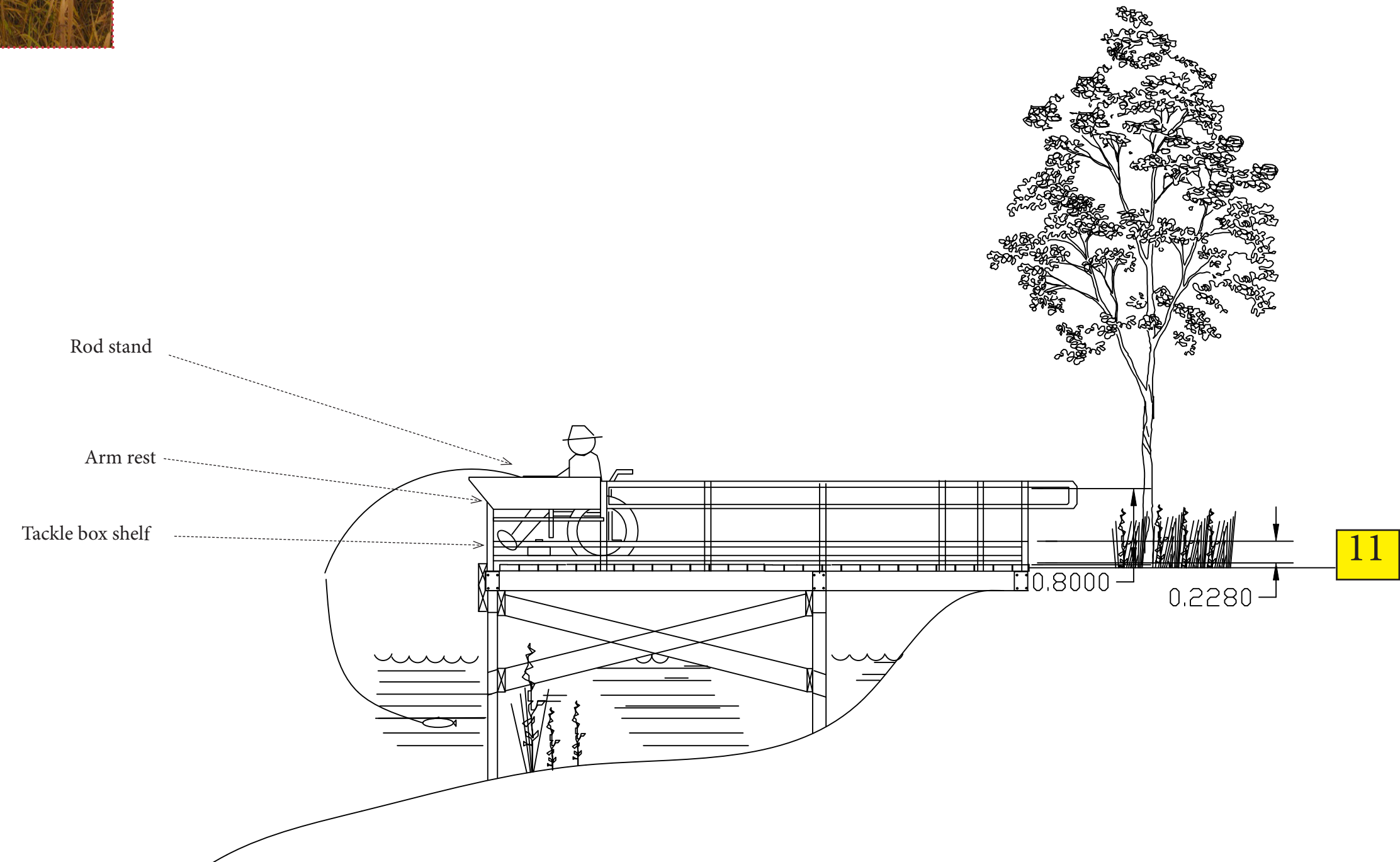
Anti-slip board treatment in areas liable to occasional wetting



## Zone D



Fishing stand universal access

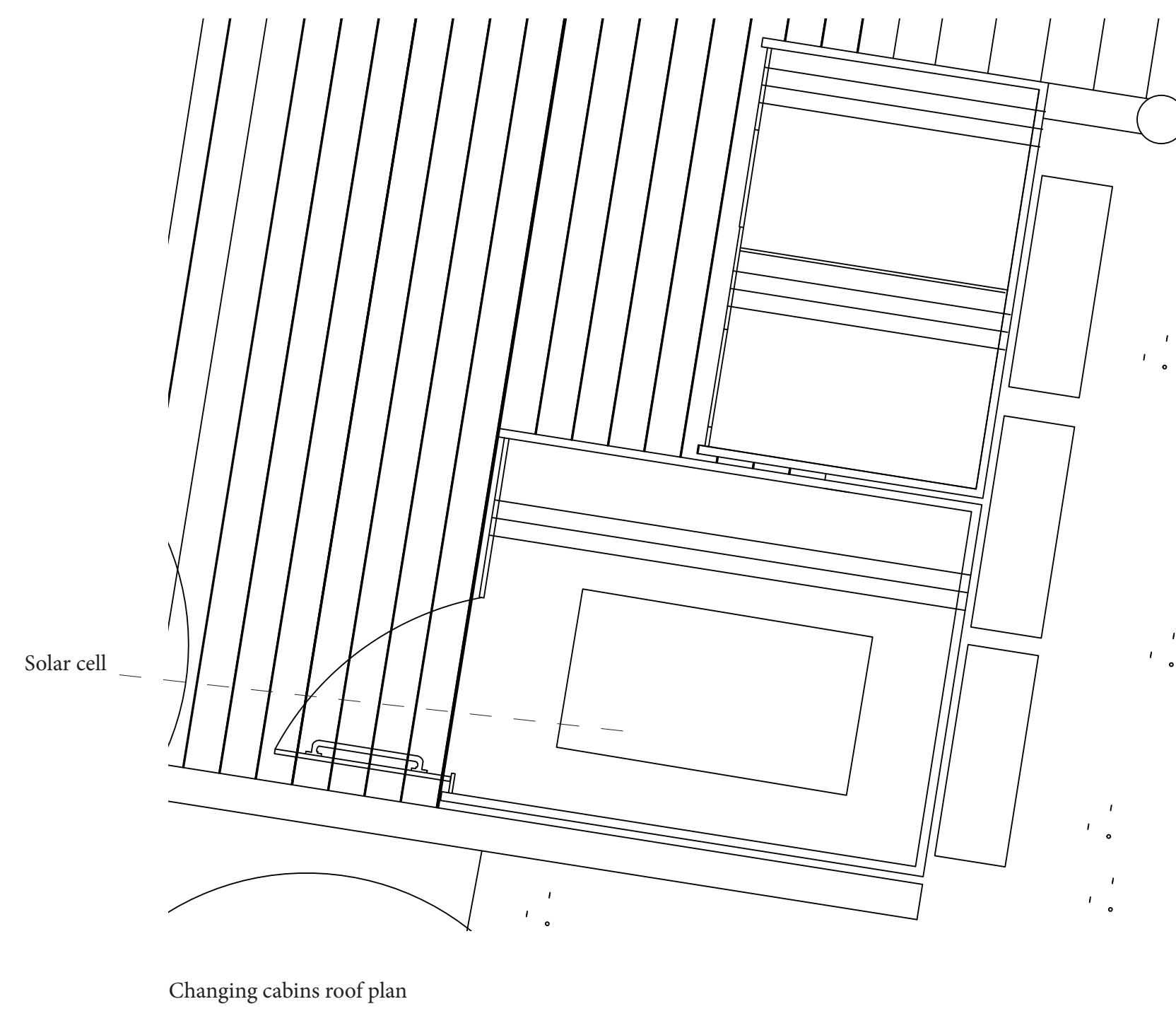
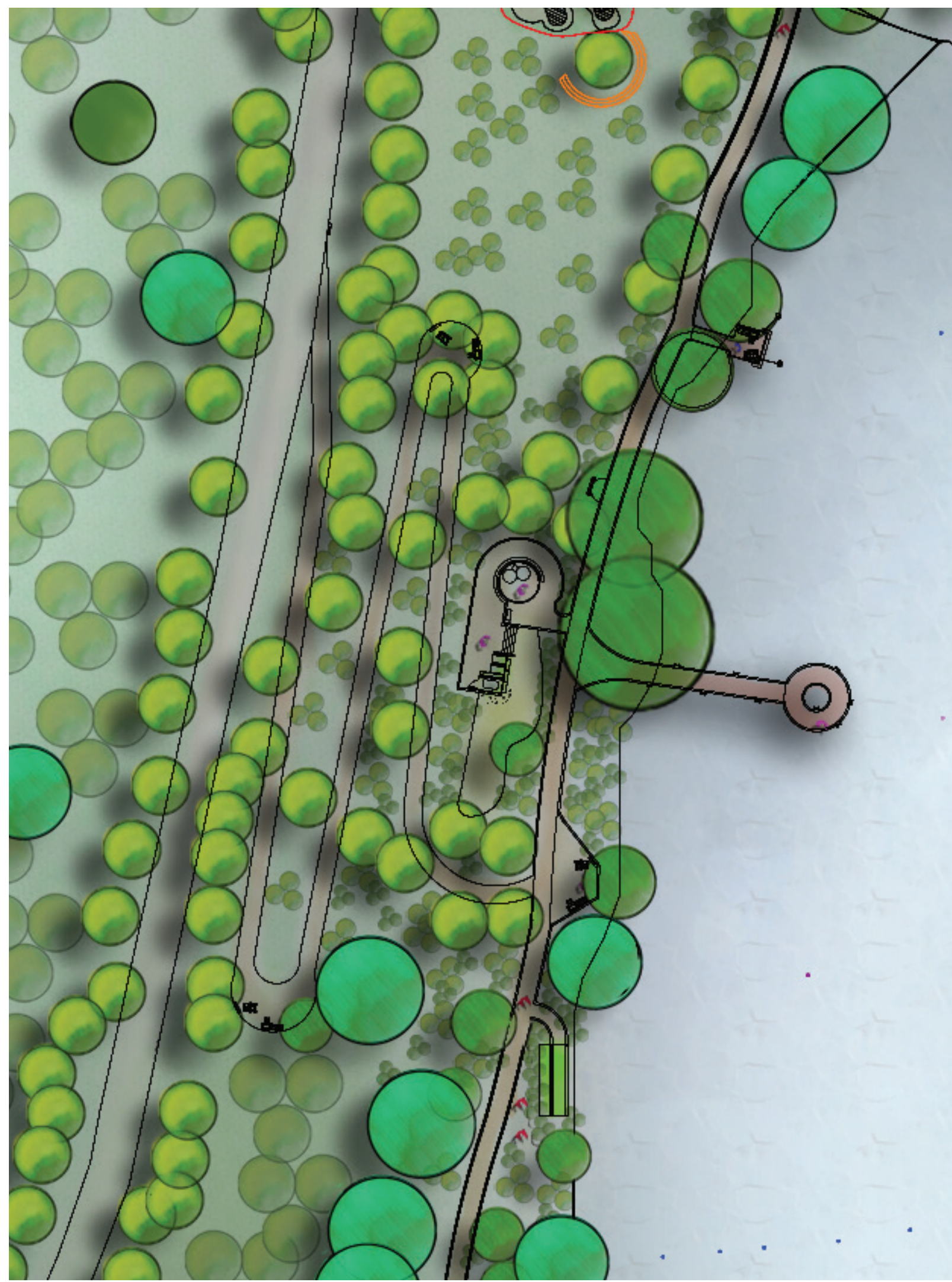


Project; Lough Bracken  
 Client; Flynn Furney for Meath Partnership  
 Drawing; Masterplan detail Zone B Zone D  
 Drawing No. ; MLBLMP031A  
 Drawn by; GH  
 Scale ; Varies 1:500 1:50 1:20 NTS Print A0  
 Date; 22/12/21

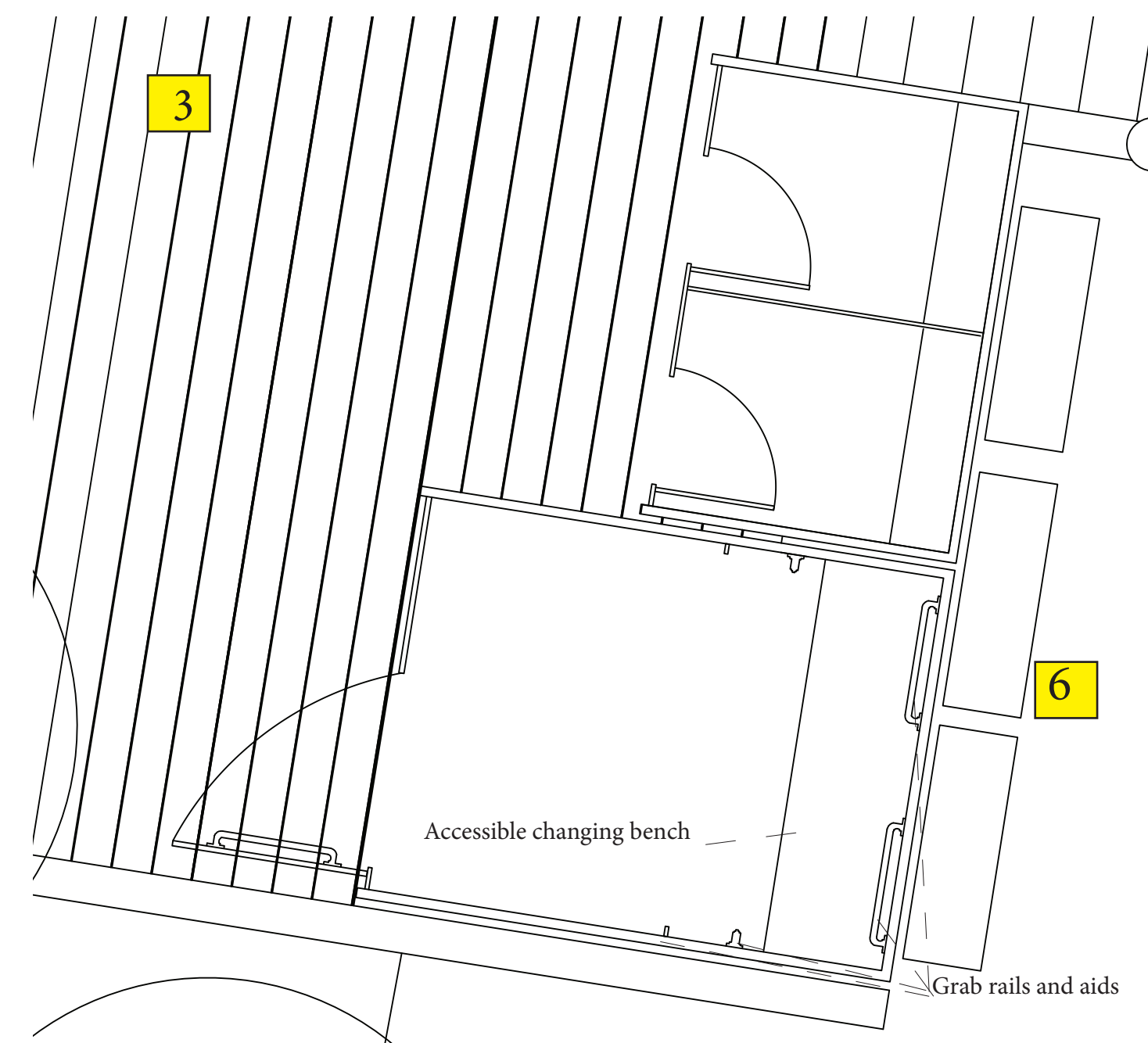


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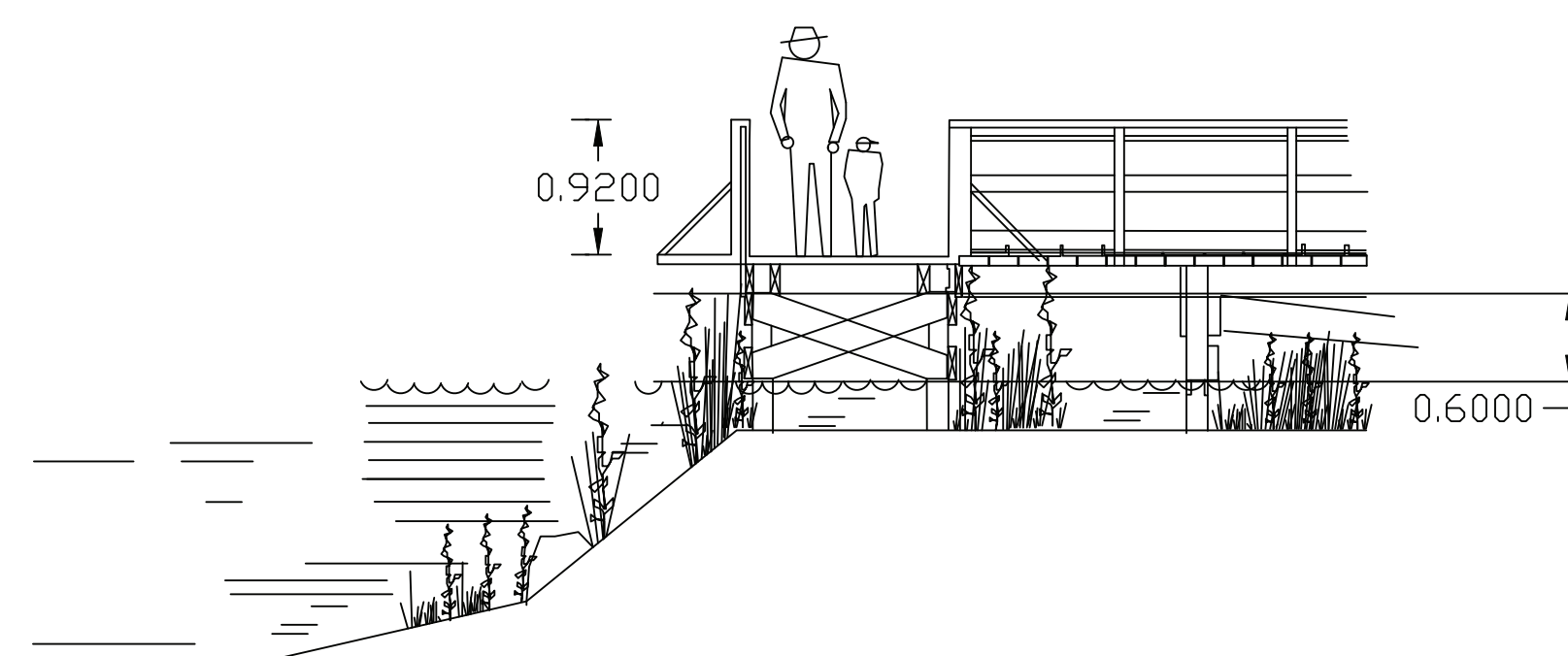
# Landscape Plan Zone E



Changing cabins roof plan



Changing cabins floor plan showing universally accessible unit with appropriately positioned bench and grab rails. Door mounted rails are also necessary.



Universal access routes with good rail protection whilst allowing viewing. Boardwalk to clear 600mm over water body



Example of universally accessible boardwalk over a wetland system



Viewing and trail head information from a boardwalk. Tactile information should also be available.

Zone E to be the core of the lake complex. The circulation design is determined by the level of accessibility afforded to visitors and the requirement to guide visitor access at the lakeshore and protect the lakes riparian area. The trails in Zone E are aimed at universal access and challenging access. The finished as-built alignments to determine the information to be included on trail head boards and park promotion material. Detailed tree surveys as agreed with Coillte to determine the precise location of forestry trees to be removed. Precise level survey to determine the boardwalk route to the higher forestry road level. The grading of the as built trails to be in accordance with the Irish Wheelchair Association and Sports Ireland guidelines for accessibility in parks and outdoor recreational facilities

## Legend

1. Bathing pier/ viewing point. Different bathing depths facilitated and the bathing pier placed to minimise or eliminate shoreline erosion. Jetty ladders at frequent intervals to facilitate all swimming abilities. A circular theme informed by the presence of Lough Bracken mound can also double as a viewing point in the cooler seasons. All bathing areas and risk assessments to follow Water safety Ireland guidelines.

2. Trail head information to include information on slope, trail length, accessibility etc. Information to be communicated using visual information, tactile information and digitally/ aurally using scan code or similar mobile app.

3. Boardwalk to be universally accessible with no greater than 6mm between boards. Safety rail to simultaneously assign trail and keep recreational users to trail preventing erosion and vegetative wear. Tipper board min 150mm high to line full length of this circulation route.

4. Universal access to outdoor rinse shower. Slope at base to be no greater than 2% with grab rail surrounding the shower post. Changing area to rear of shower post for convenient access. Rinse shower on post with encircling grab rail on non slip floor with slope no greater than 2% to drain. Open timber enclosure to also have a circular theme and allow access to the adjacent changing cabins to encircle shower area.

5. Short ramp to changing area. Universal access/ family access, changing cabin with two smaller adjacent cabins. Cabins to have a sedum roof with roof mounted solar panel to warm rinse water.

6. Wooden steps to perched beach with 450mm high benches at beach.

7. Perched beach to provide a fun area for small children and carers but carefully situated out of reach of the high flood mark with a good margin of vegetation between the beach and the lake shoreline to ensure filtration of silt and sand prior to water entry to the lake. The perched beach to also have a filter fabric lining the base of the beach.

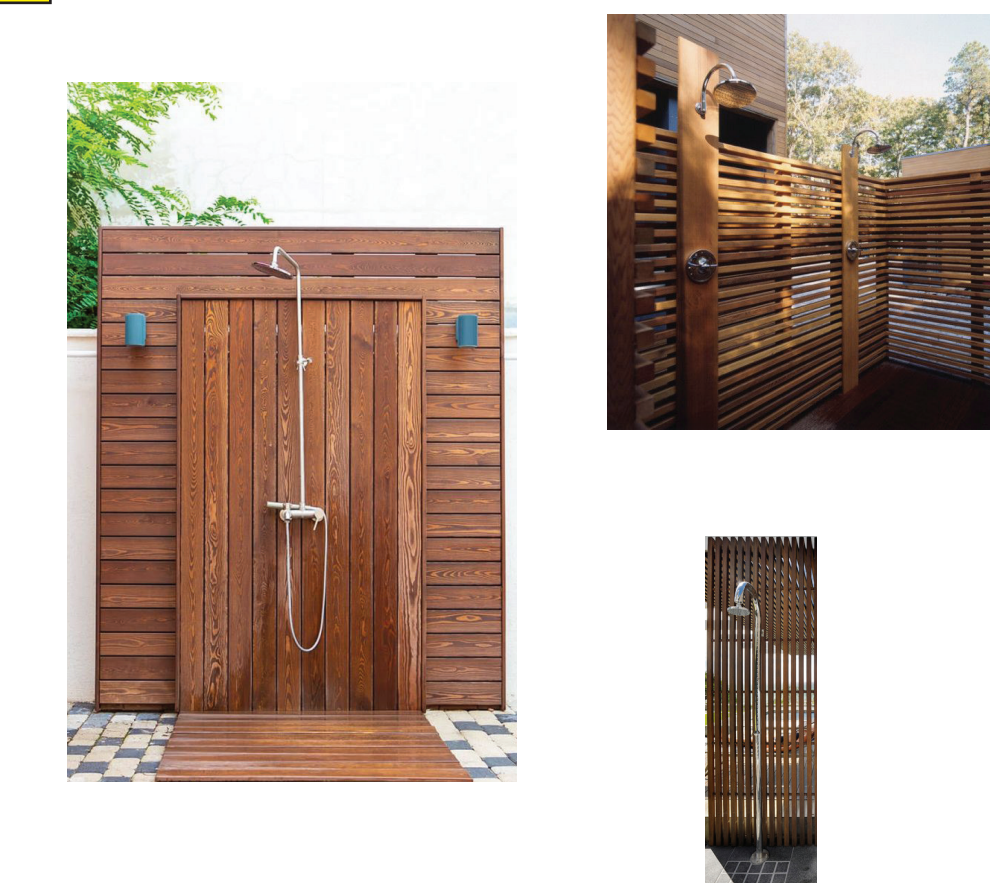
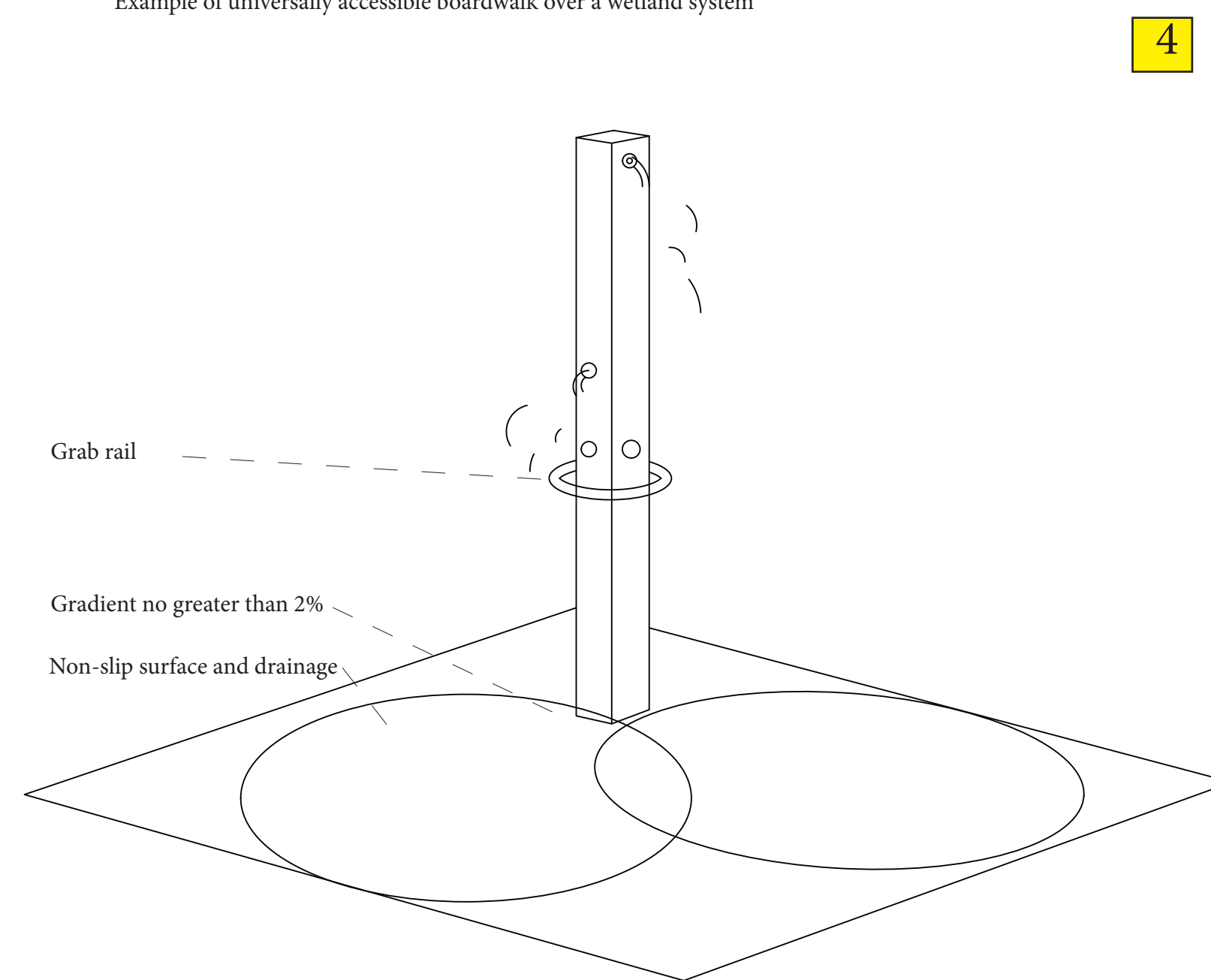
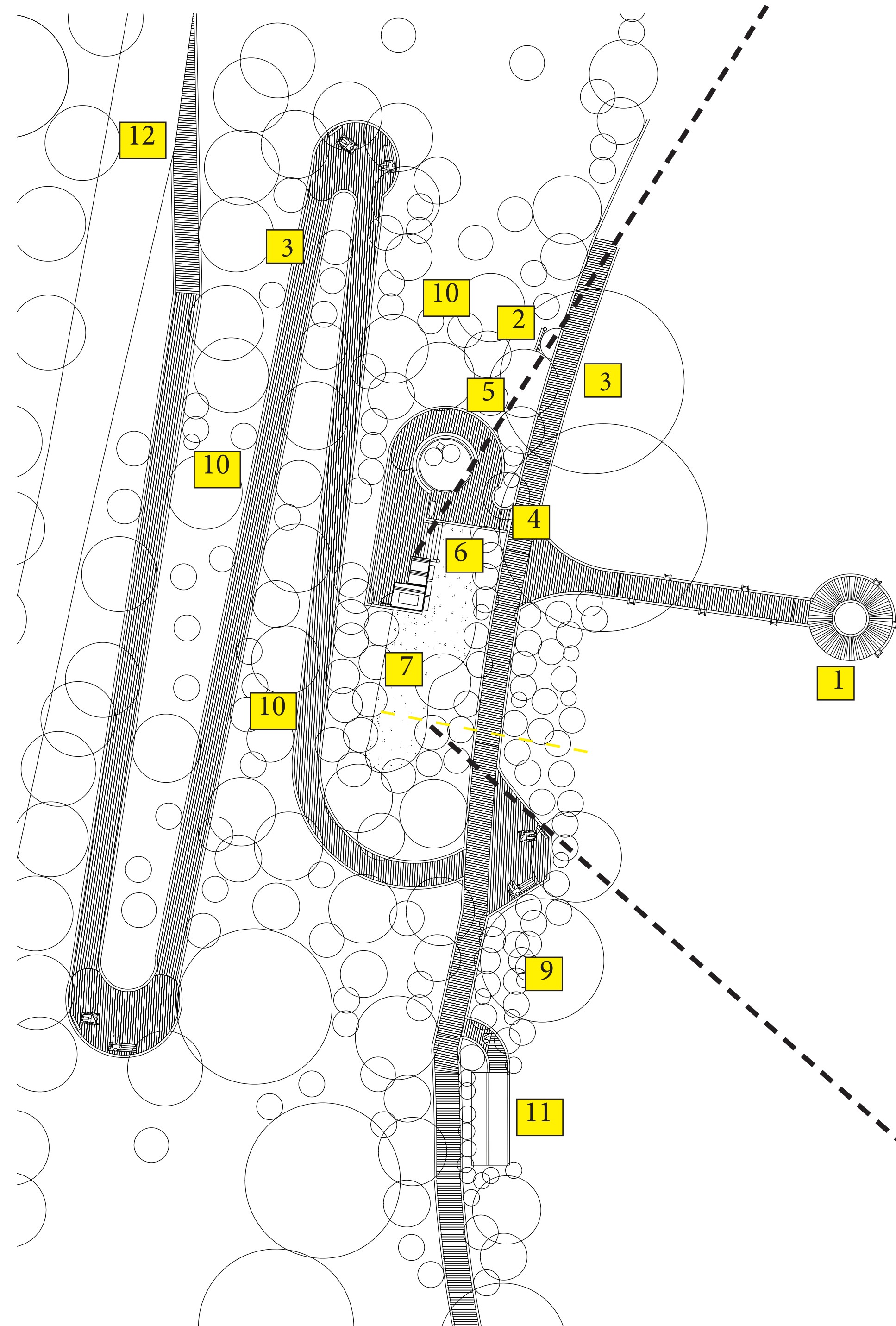
8. Resting places to be located frequently along the boardwalk to facilitate all users, preferably placed with interesting viewing points or at points of interest. Seat height to be 450mm. Resting places to be set back min 600mm from trail edge. A change in colour or wood to assist visually impaired to identify seating.

9. Lake shore planting to be propagated from healthy on site existing stock with relevant propagation licenses/permissions as required. Planting to match existing riparian combinations at each location.

10. Forestry trees to be gradually replaced in this area by oak, holly, hazel, beech, alder, birch, willow as relevant for soil type, proximity to riparian zone, slope and position of boardwalk. The woodland floor to gradually regenerate through careful landscape management. Some planting of carefully sourced fern varieties, bluebells and snowdrops to add interest. All materials imported into the site to have a high level of pathology scrutiny, to have provenance identified back to propagation nursery and to be of Irish provenance.

11. Universally accessible bird hide

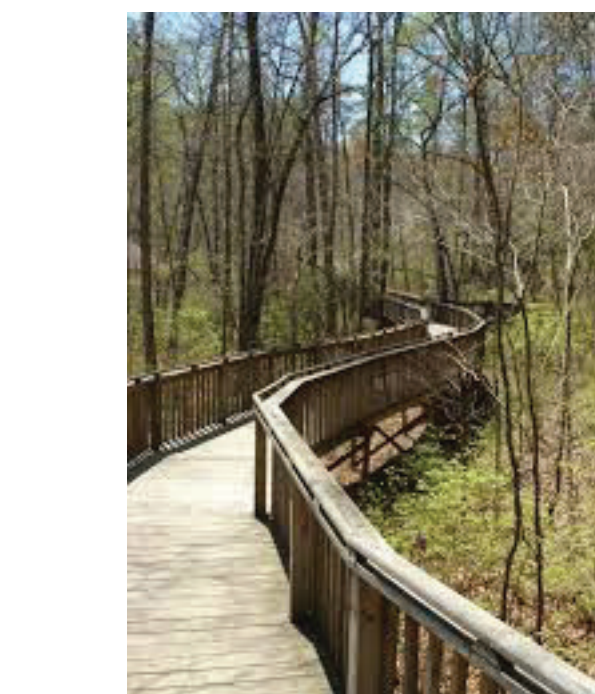
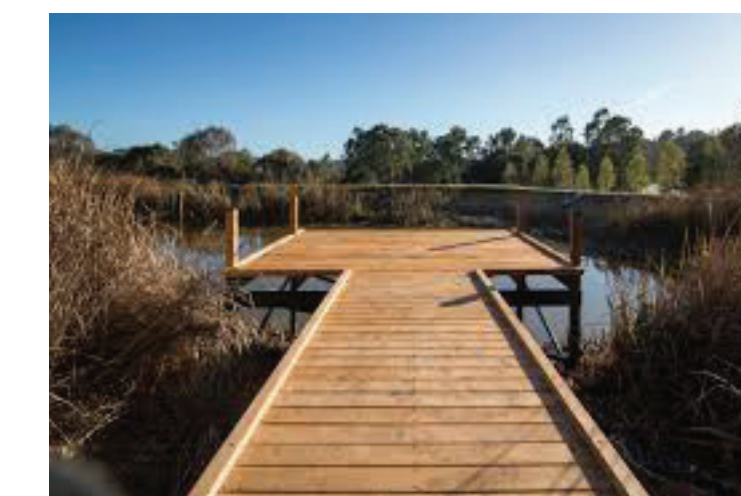
12. Exit and reconnect to existing forestry road. The road to be accessible and clear of debris, branches, with all potholes filled and surfaces maintained. The central grass margin to be trimmed to allow 1m passage on either side.



Rinsing shower heated from solar panels mounted on changing room roof. Rain water harvesting to supply water source with automatic UV disinfectant. Shower post with circular grab rail for universal access mounted under the shower head between 840-950mm above shower floor. Floor to slope no more than 2% in all directions or as advised by ability consultant.



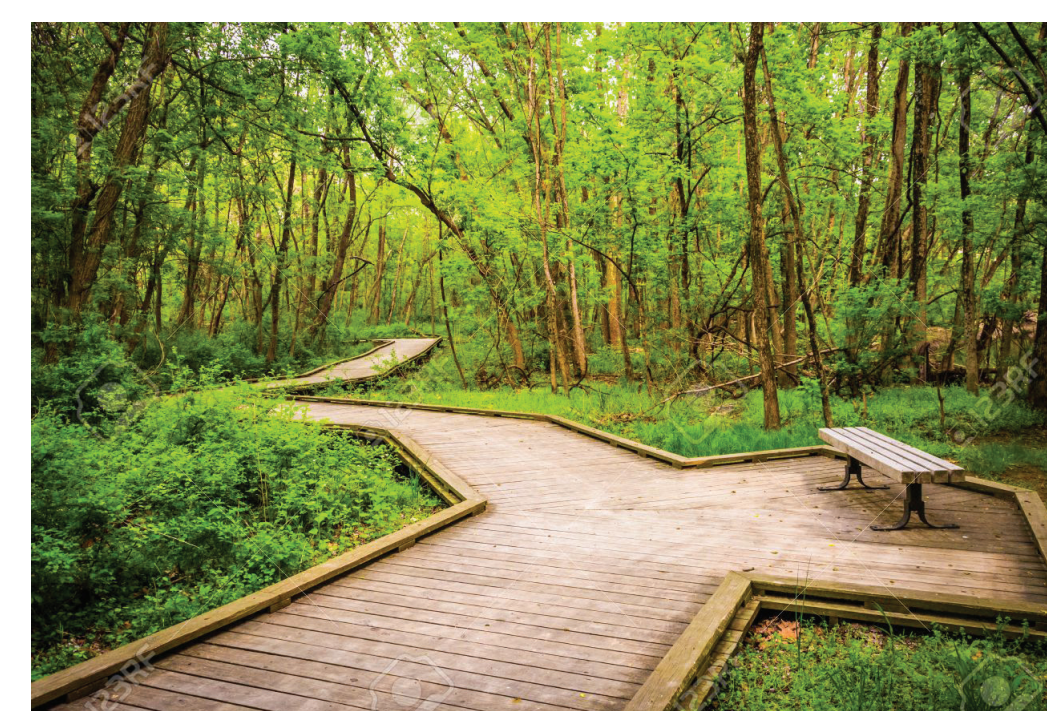
Swimming piers to facilitate swimming at differing depths of water, long enough to allow for multiple users in fine weather. Swimming piers to double as viewing platforms



Universal access grade through woodland to also define the route through the trees. Forestry conifers to be removed to allow access and replanting to include oak with a hazel and holly under story layer and beech with bluebells on the woodland floor providing interest. Riparian trees to be used closer to the water's edge like birch, alder and willow and where bank stabilisation is required.



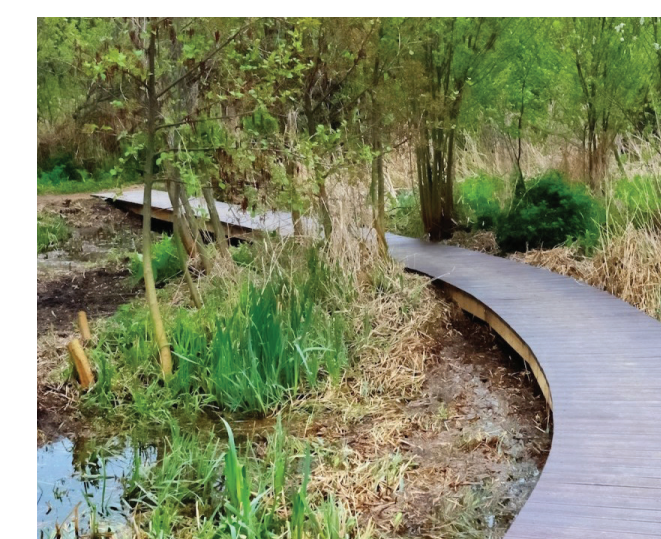
Trail head information advising as to the length and accessibility grade of the loop



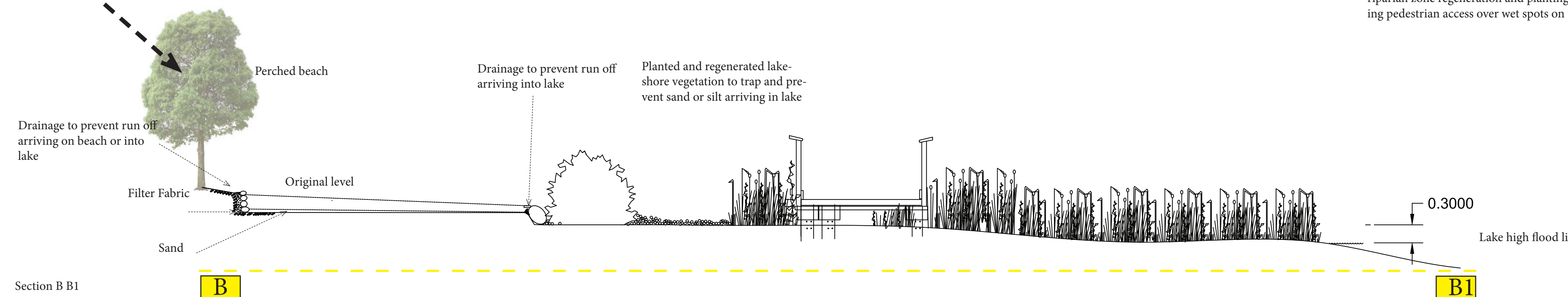
Woodland walk typical of challenging access circulation trails with tipper rail and rest spots set back min 600mm from boardwalk



Rest bench composed of durable recycled plastic



Simple boardwalk, ungraded for access, to allow for riparian zone regeneration and planting whilst allowing pedestrian access over wet spots on the trail.



Project; Lough Bracken  
 Client; Flynn Furney for Meath Partnership  
 Drawing; Landscape Masterplan  
 Drawing No.; MLBLMP032A  
 Drawn by; GH  
 Scale; Varies 1:500, 1:100 1:50, 1:30 NTS Print A0  
 Date; 22/12/21

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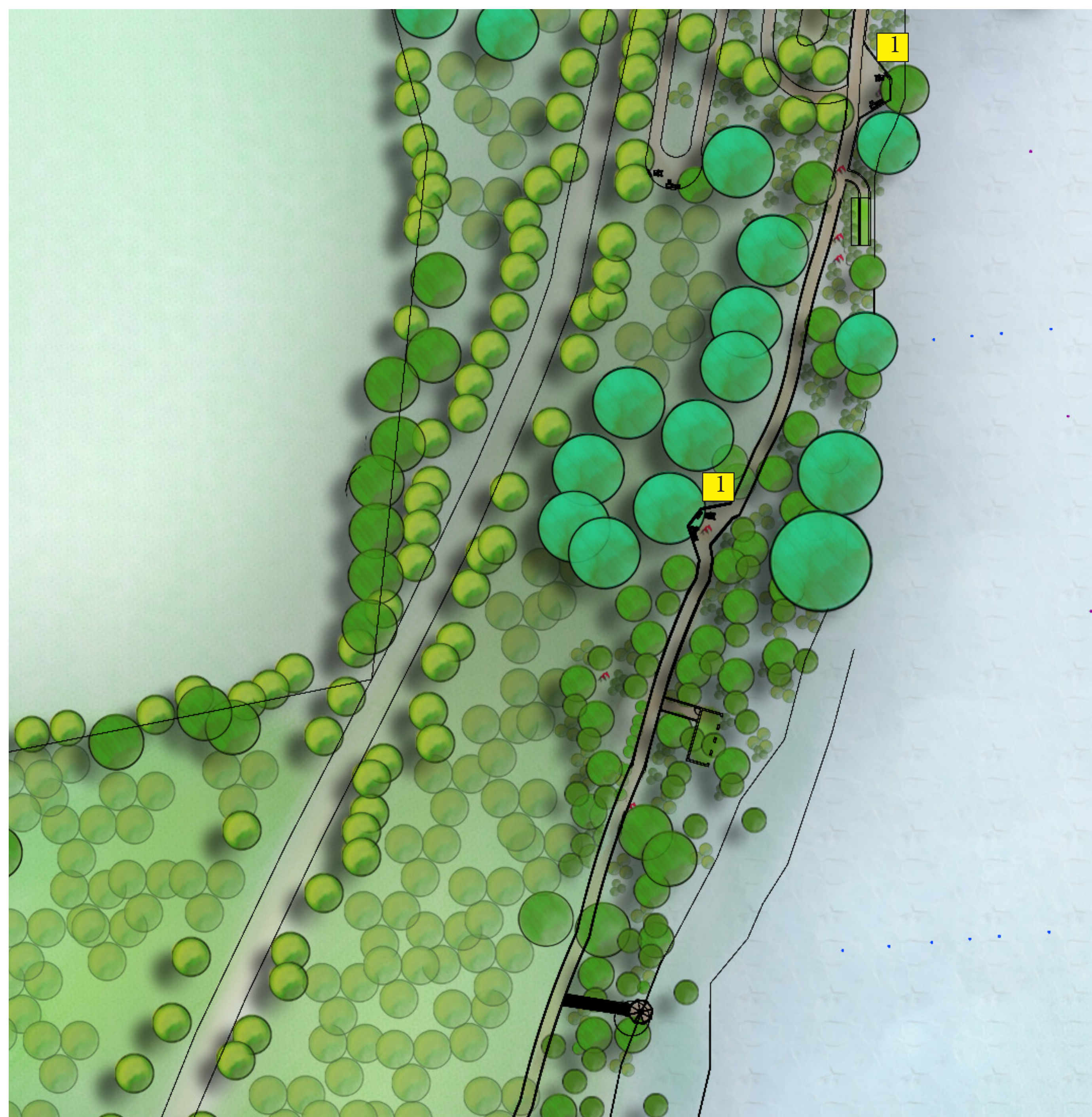
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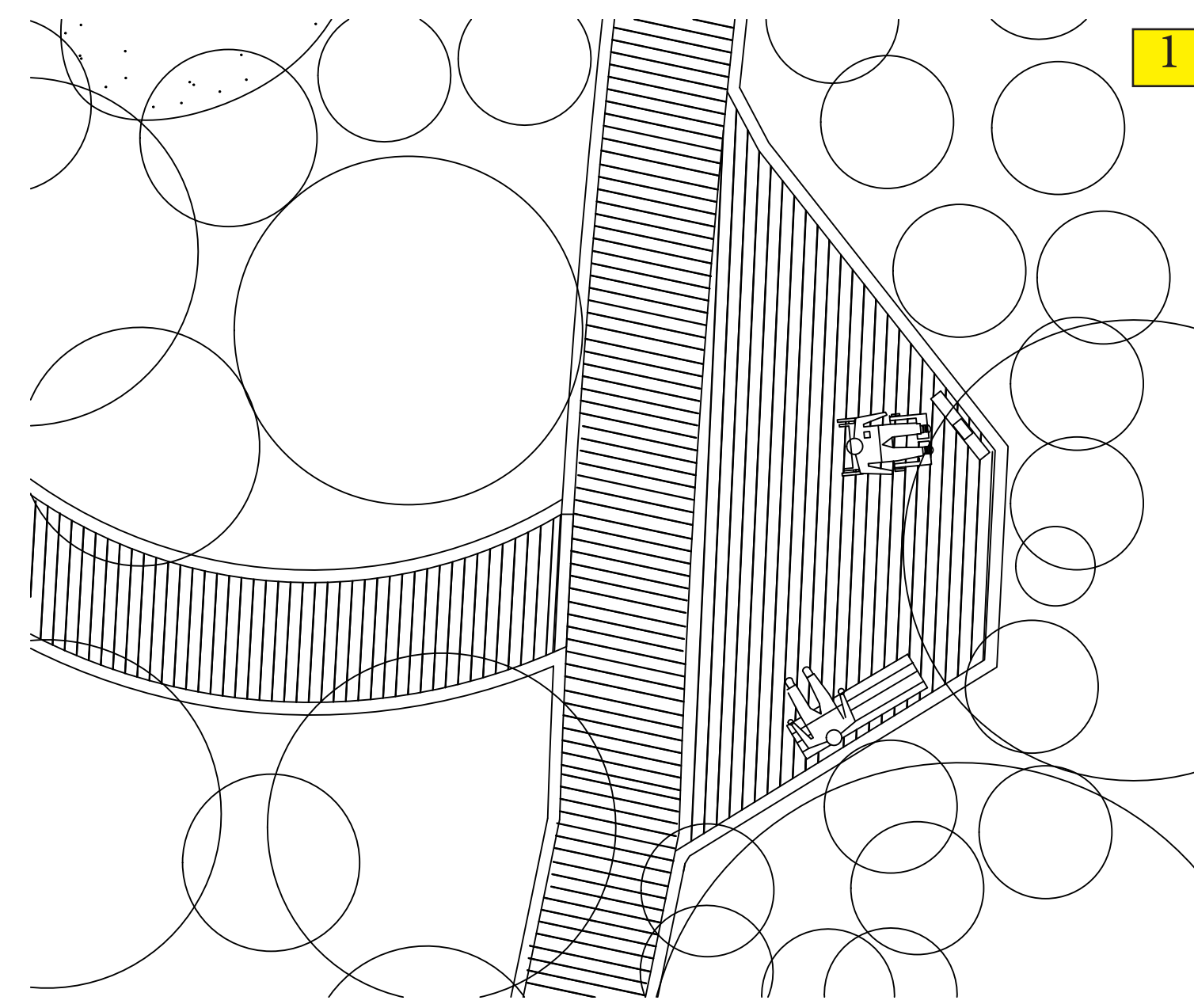
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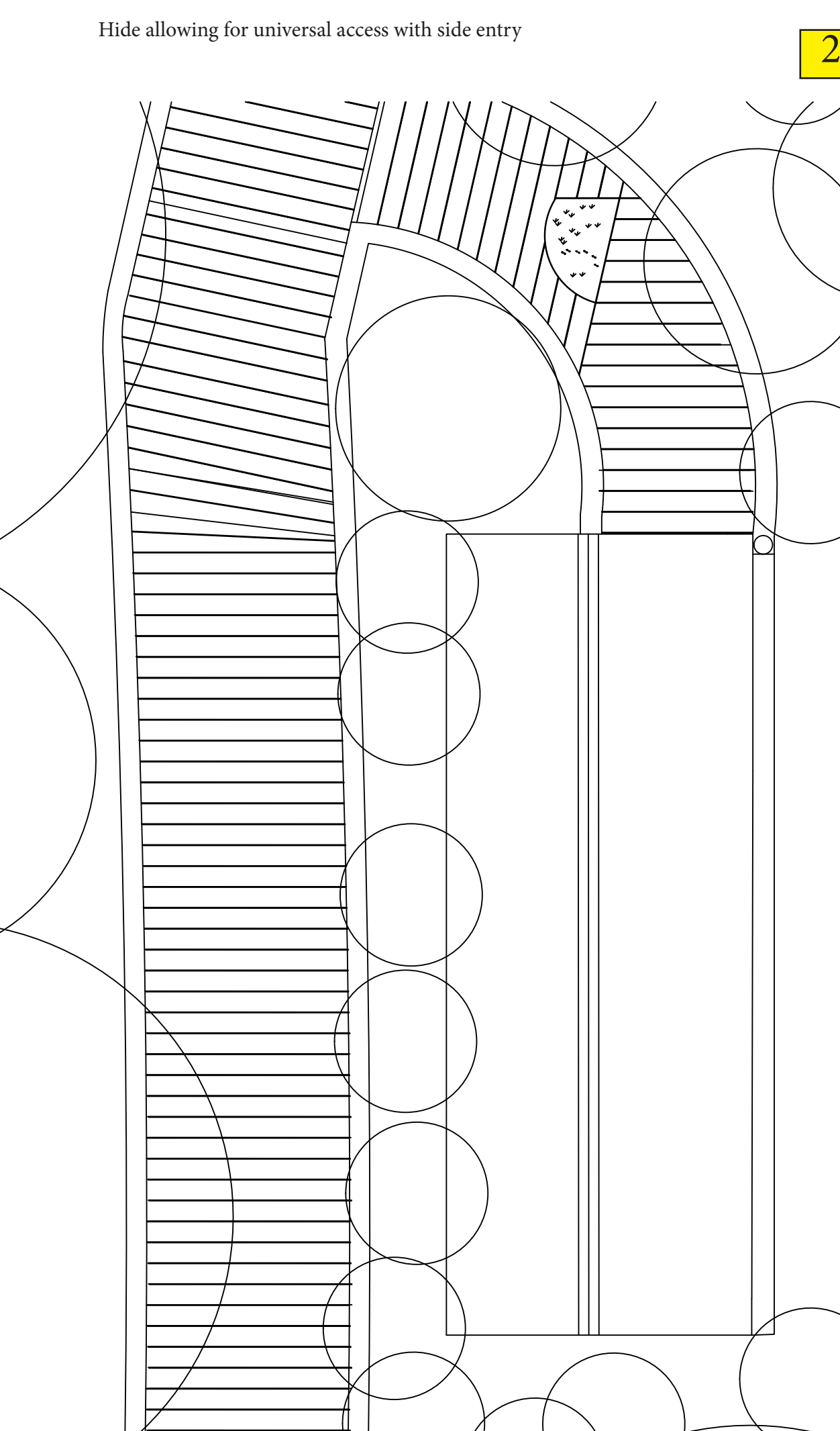
# Landscape Plan Zone F, G, H



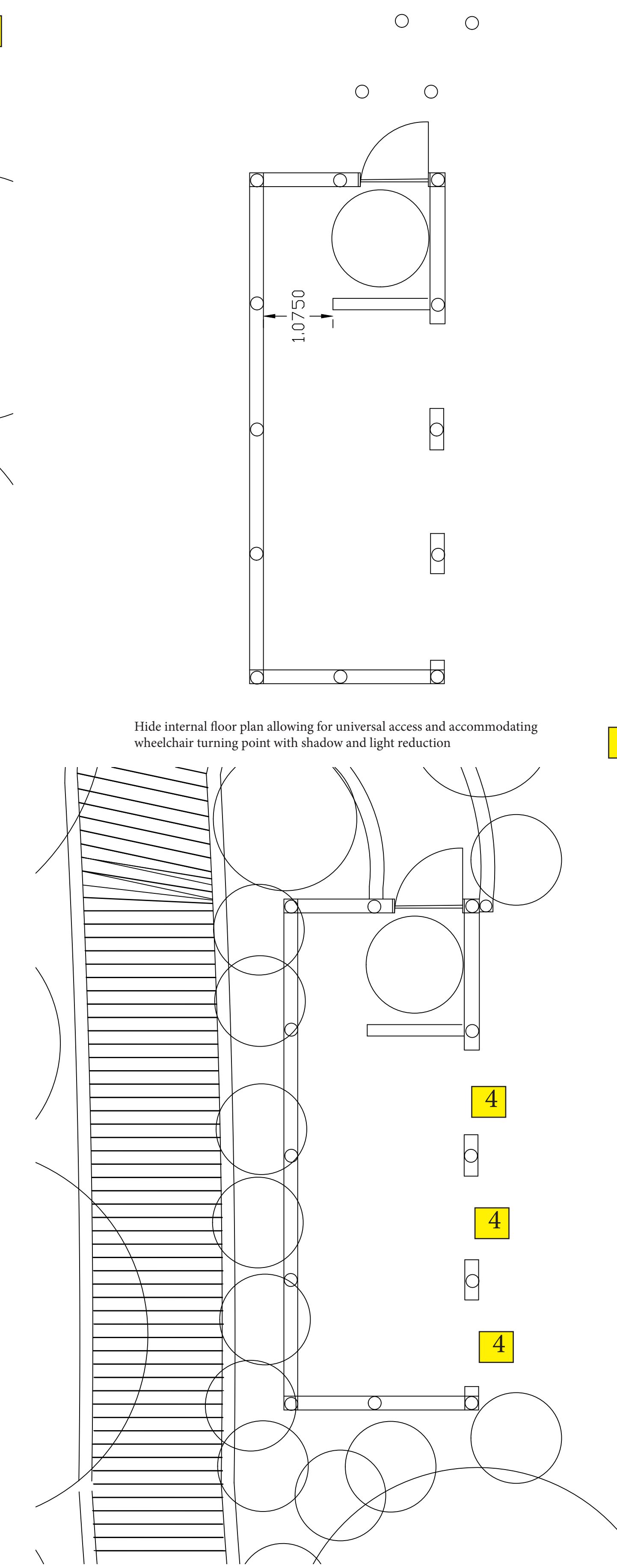
## ZONE F



Rest area accessible directly from board walk



Hide allowing for universal access with side entry



Hide internal floor plan allowing for universal access and accommodating wheelchair turning point with shadow and light reduction

## Legend

1. Rest areas to facilitate all users at regular intervals. A typical rest area such as this one to enjoy views of the lake and forest. Trail head information to be placed at rest areas like this, but not required at simpler rest areas every 100m. Habitat information to be integrated into the rest area, relevant to each specific location. Rest areas to be set back at least 600mm from the main trail.
2. Zone F, Fully accessible side entry bird hide, roof plan. Habitat information to be integrated into the boardwalk.
3. Bird hide floor plan with wheelchair turning point and entry spaces minimum 1m. Light and shadow within the hide to be reduced by placing partition opposite door entry point. Back wall to be used to display relevant bird and habitat information for this location.
4. Hide hatches
5. Zone G Accessible bird hide with sedum or shingle roof detail. This hide to be entered from the back and access to be universal. Door widths to be 1m min and approach ramp 2m wide min.
6. Hide hatch space to accommodate wheelchairs with shelf space to allow for arm rest, binoculars, camera equipment etc. Leg room allowed for will result in a generous and comfortable hide for all users.
7. Circular partition opposite entry door to reduce light and shadow within the hide and allow for wheelchair turning.
8. Habitat and bird information to be displayed on the back wall. This information to be appropriate to the hide location.
9. Zone H Circular/octagonal bird hide with sedum or shingle roof. Wheelchair turning space within the centre of the hide.
10. Hide to have a universally accessible rear ramp 2m wide with handrails and tipper rail 150mm min to edge.
11. Short habitat information notes and images to be displayed above the hatches inside the hide.

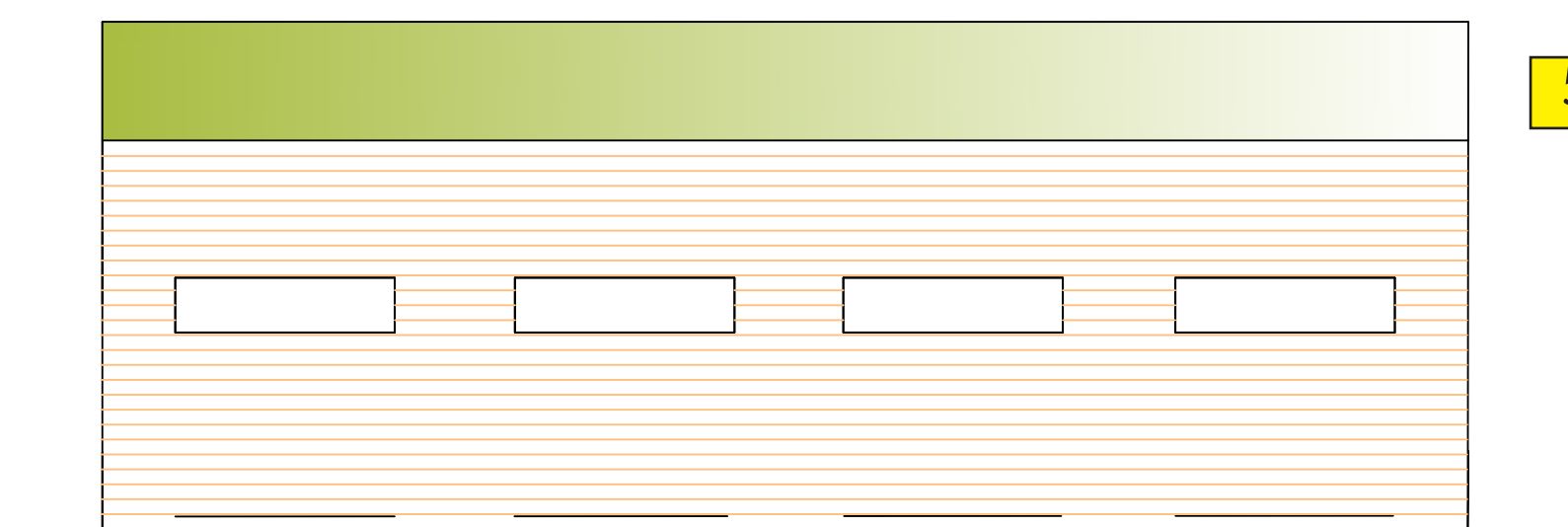


Large hide composed of timber materials situated near water body

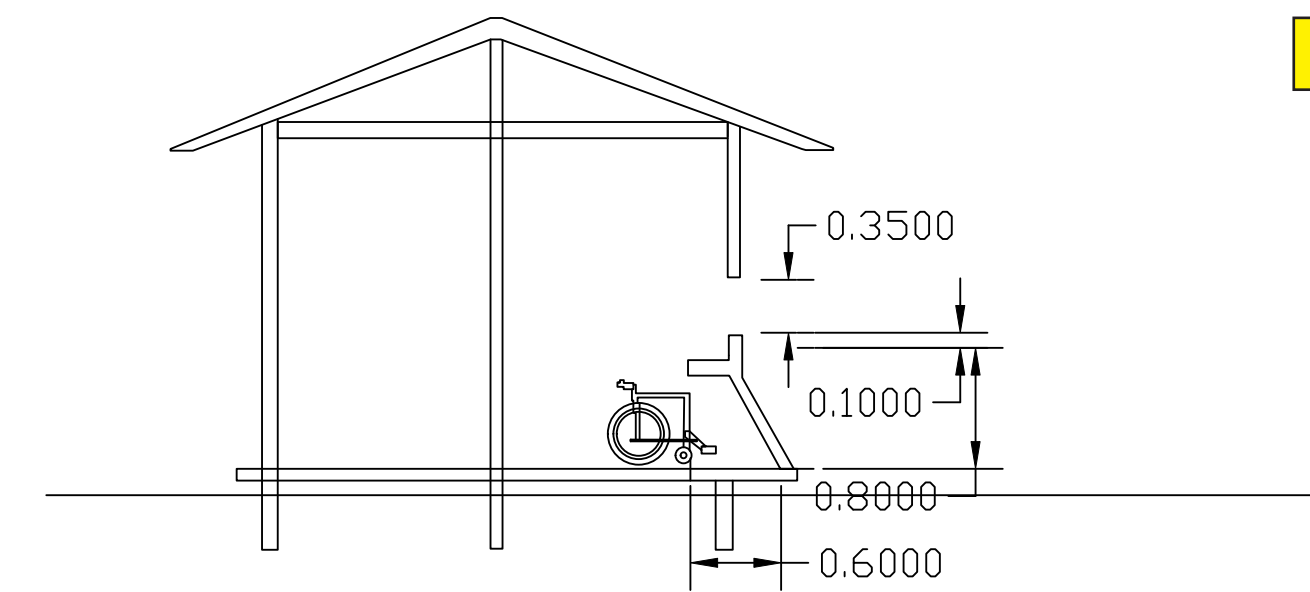


Bird hide composed of timber materials with glazed hatches and rear universal access ramp with a high degree of light and shadow reduction.

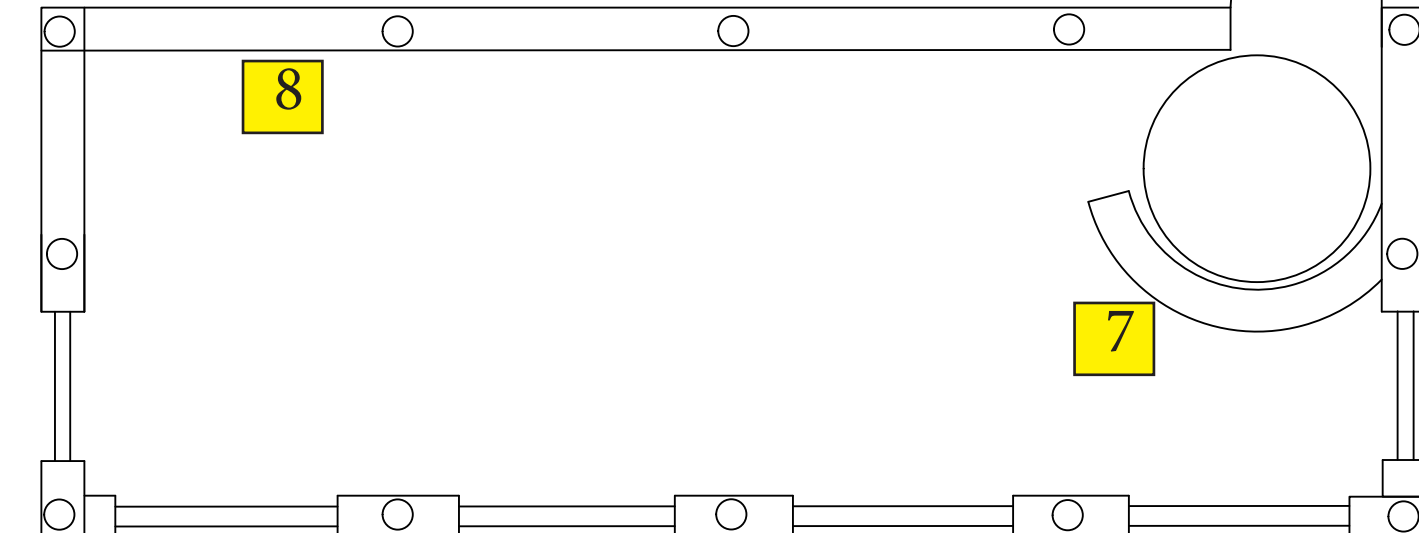
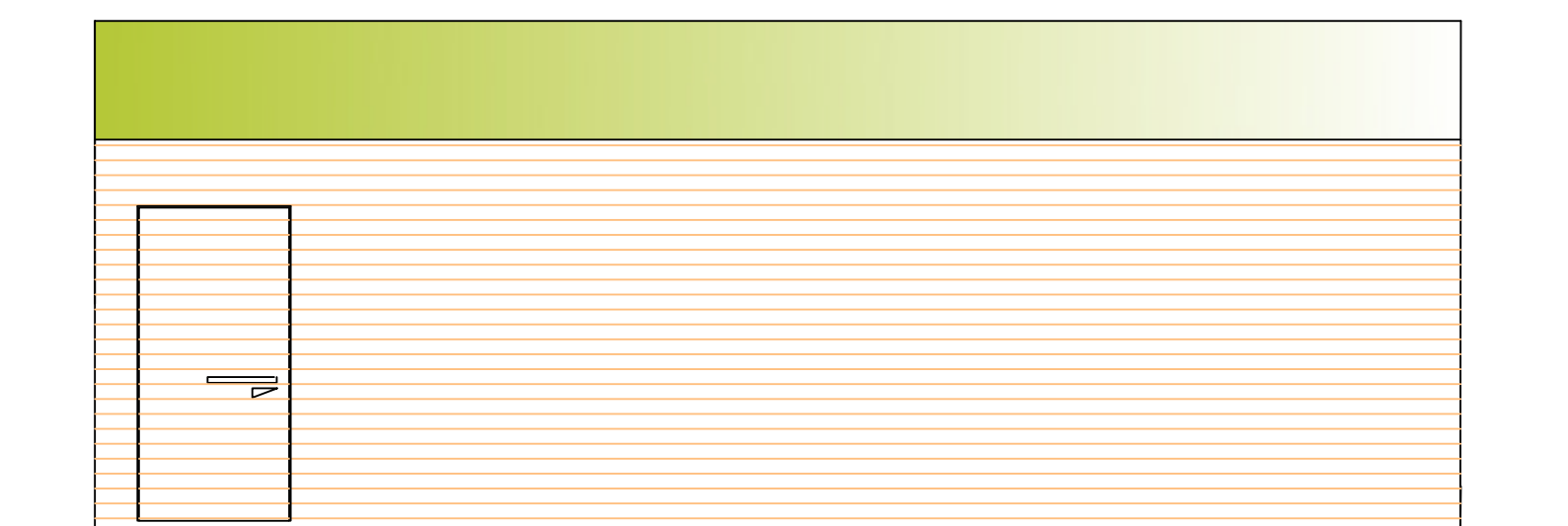
## ZONE G



5



6

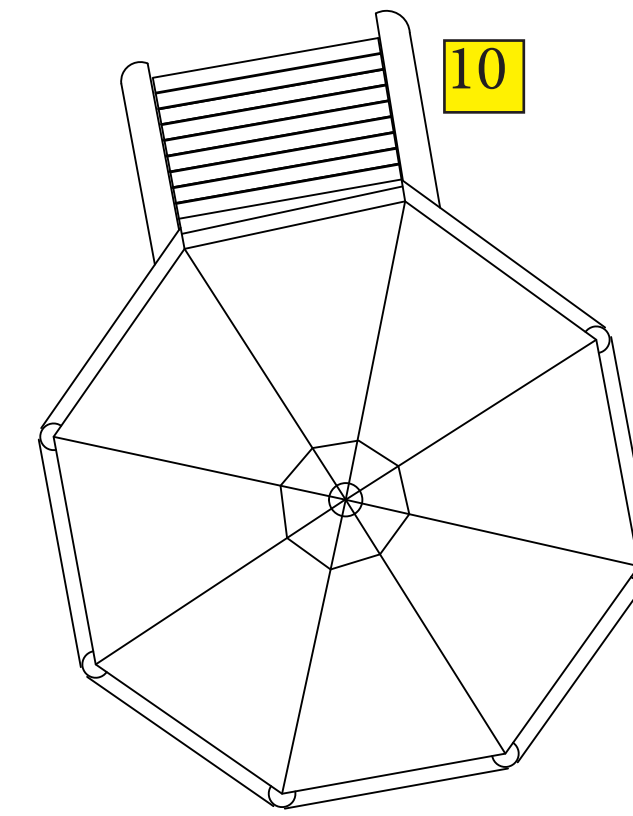


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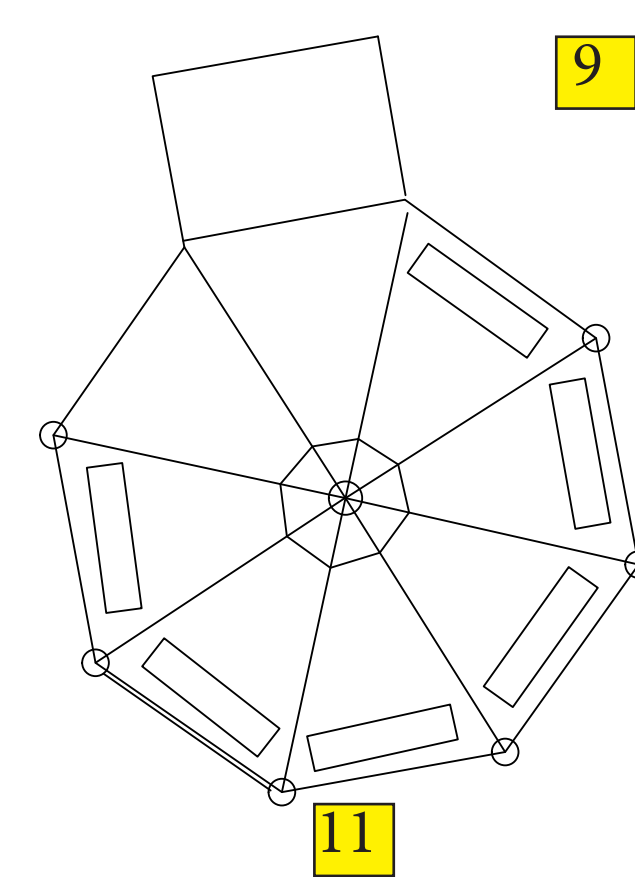
7

## ZONE H

Circular hide with internal turning point and fully accessible entry ramp.



10



9

11

10

Discreet displays of habitat information at appropriate locations to also be communicated in tactile format with an ability to connect to a phone app at each location for aural/visual information.



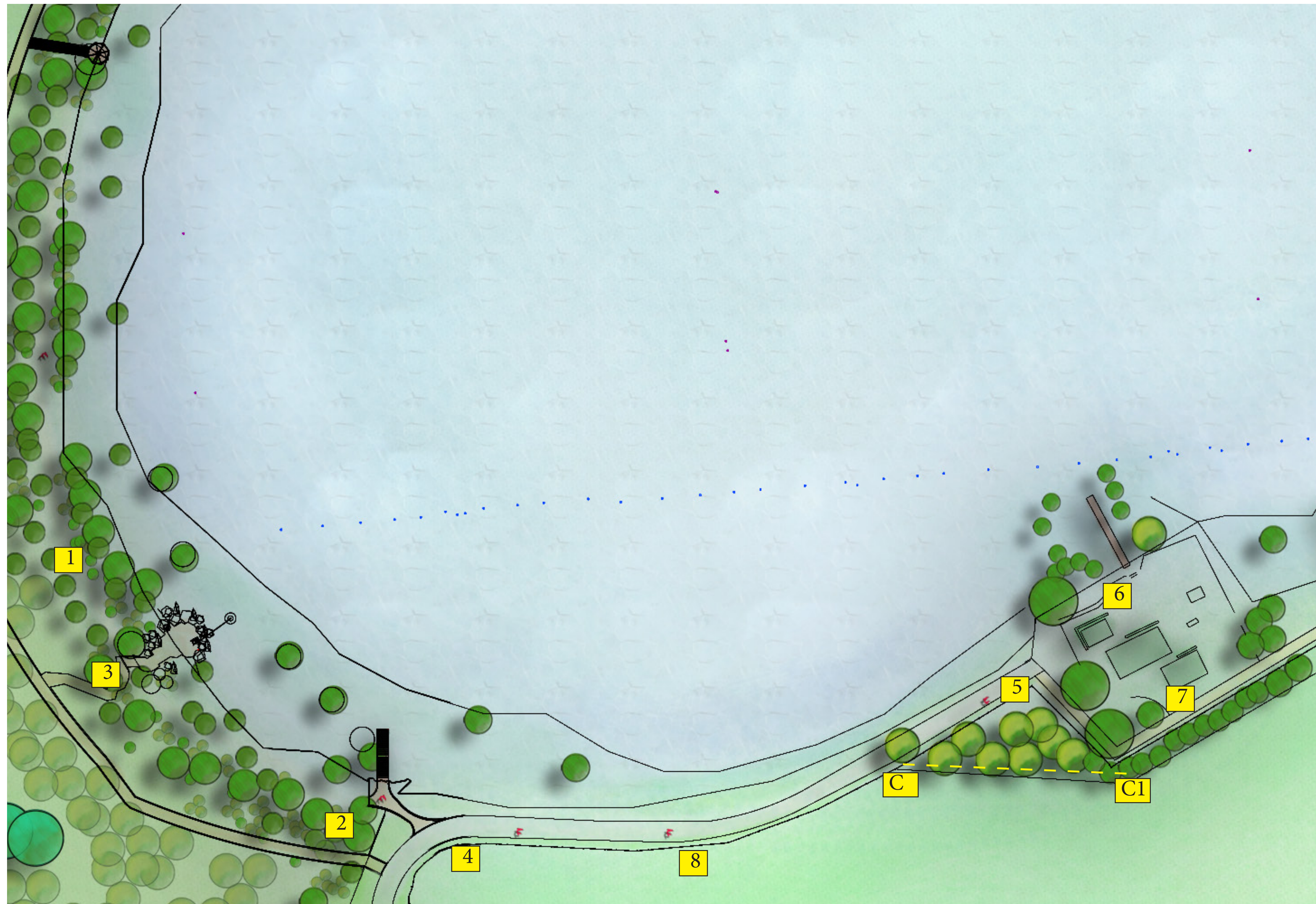
Project; Lough Bracken  
 Client; Flynn Furney for Meath Partnership  
 Drawing; Masterplan Detail, Zone F, G, H  
 Drawing No.; MLBLMP033A  
 Drawn by; GH  
 Scale; Varies 1:500, 1:30, NTS Print A0  
 Date; 22/12/21

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Willow or hazel woven into panels to screen temporary structures and buildings at the water plant



Sample of woven panels adjacent to temporary or movable structures add a sense of unity to a lakeside setting ensuring the image of lake is visually integrated into the overall development and landscape.



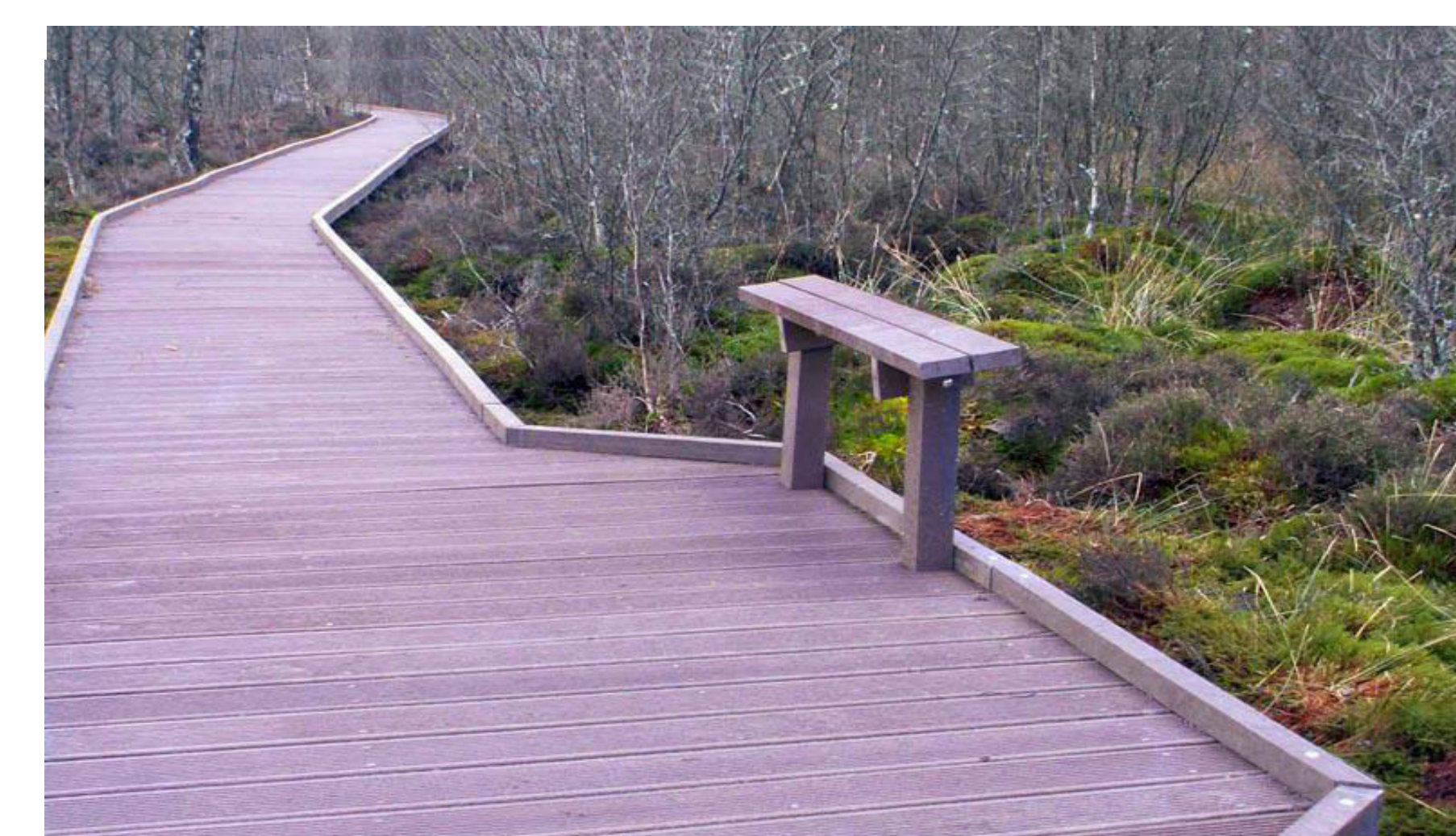
Pond dipping platform to coincide with boathouse zone. This zone to be specific to pond dipping and educational activity. School activity with small platforms such as this one to be used in fine weather.



Screening of the water plant and temporary structures using woven panels to reflect the screening used adjacent to bird hides. This will soften the buildings appearance at such a dominant location.



Challenging access trail grading along this length of the alignment to continue to utilise tipper boards min 150mm high at the edges of the boardwalk. Rest spots to be provided at 100m intervals using simple timber seating.

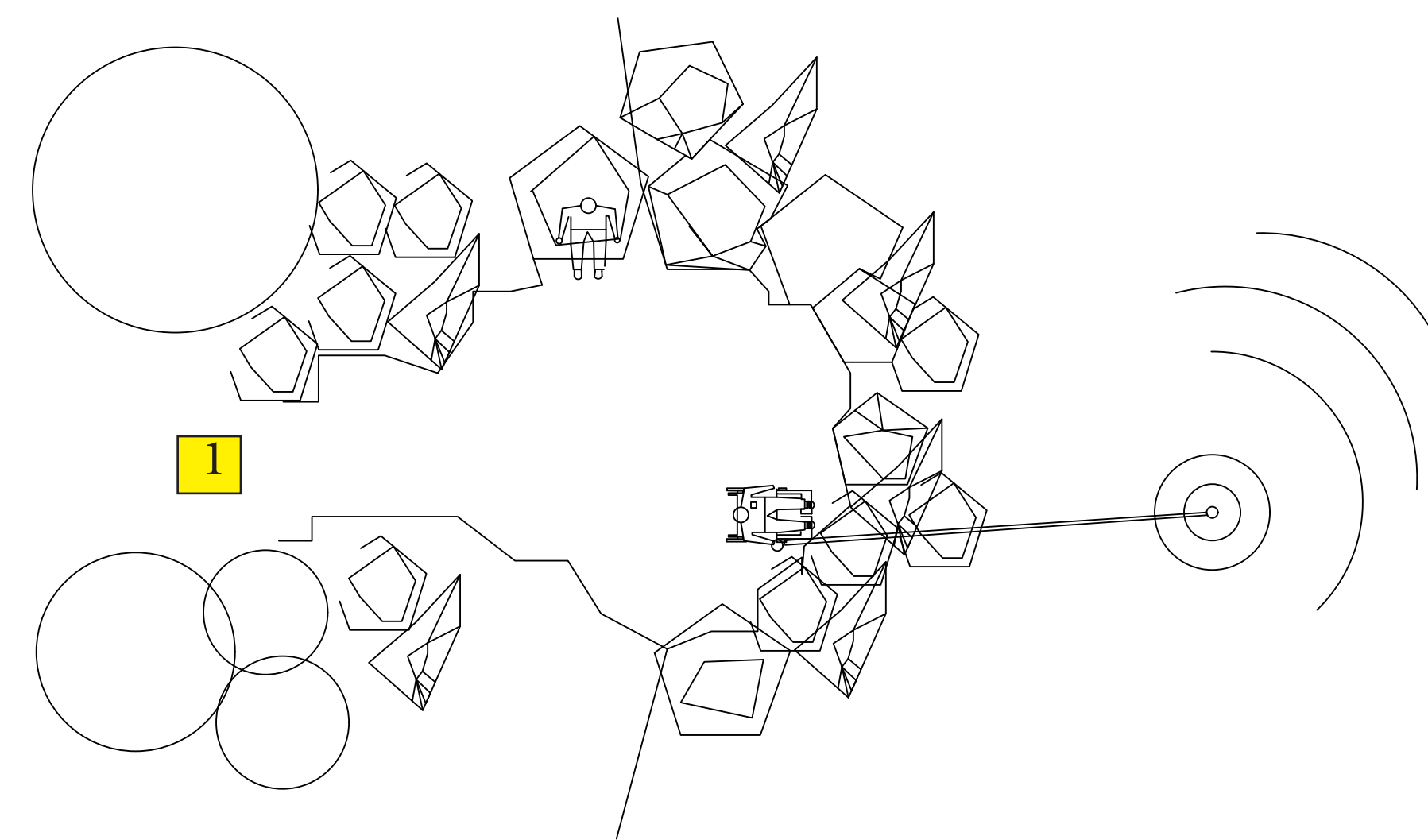


# Landscape Plan Zone I, J, K

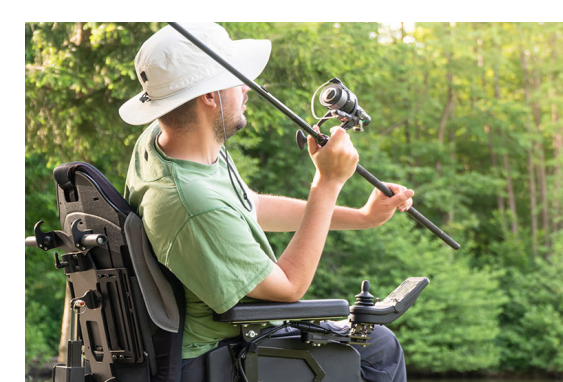
## Legend

1. Natural access zone slightly away from the boardwalk under trees with seating and rest spot to be composed of natural rock and stone with floor surface to be of porous resin bound beige gravel. Fishing to be facilitated and crown lifting to ensure disabled fishers can cast off easily with rod stands. This zone to be aimed at challenging access graded trail users
2. The historical maps reveal this to be the location of the original boat house. A new dipping platform to be constructed on the site of the original boathouse jetty.
3. Challenging access trail grading along this length of the alignment to continue to utilise tipper boards min 150mm high at the edges of the boardwalk. Rest spots to be provided at 100m intervals using simple timber seating. Rest areas to be set back min 600mm from main trail.
4. The board walk to merge with access road here.
5. The dominant position of the water plant in relation to the lake to be softened and integrated into the landscape. Additional planting surrounding the compound to screen the security fencing and integrate the facility into the backdrop of the hill. All pipe work to have root barrier deflection set back along its length. Trees, shrub and hedging materials chosen to eliminate or reduce any risk to water pipe infrastructure. All pipes to be located prior to planting. Trees to be 5m from pipes, shrubs and under story 2m from pipe infrastructure grasses and sedges to go over pipes as required. *Malus sylvestris*, *Prunus avium*, *Prunus padus*, *Sorbus acuparia* to be the largest allowable trees with *Corylus avellana* to outer edges of the planting with *Ilex aquifolium* to 2m of pipes and to soften the appearance of the security fencing.
6. Woven willow or hazel panels to screen off temporary and structure facades as viewed across the lake. The materials to ensure the complex appears visually united with the proposals surrounding the lake.
7. Building colour scheme to follow principles of blending agricultural buildings into the landscape. The roof of the buildings to be darker than the walls in soft gray or dark green. Walls to be a paler green with carefully selected colour tone and shade to blend buildings to the surrounding foliage and into the hill behind.
8. New fencing to separate cattle from lake shore.

## ZONE I



Natural protection from trips or falls into the lake using boulders with seating provided on selected rock surfaces. Suited to challenging access graded trail section. Crown lifting of nearby trees to ensure an enjoyable experience ensuring cast off ease.



## ZONE J



Entire platform length to have railings and tipper board fitted to ensure safety and comfort of school going ages and educators.

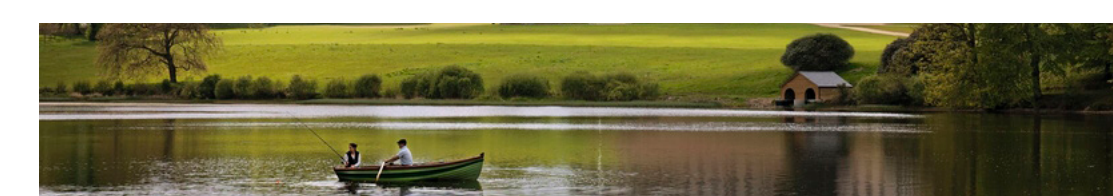
All ecological information and information and identification of aquatic life to be integrated into the railings surrounding the dipping platform or presented as here on the right. Tactile information also to be available.



A jetty similar to this adjacent to the boat house to be constructed as a dipping platform on the site of the original jetty.

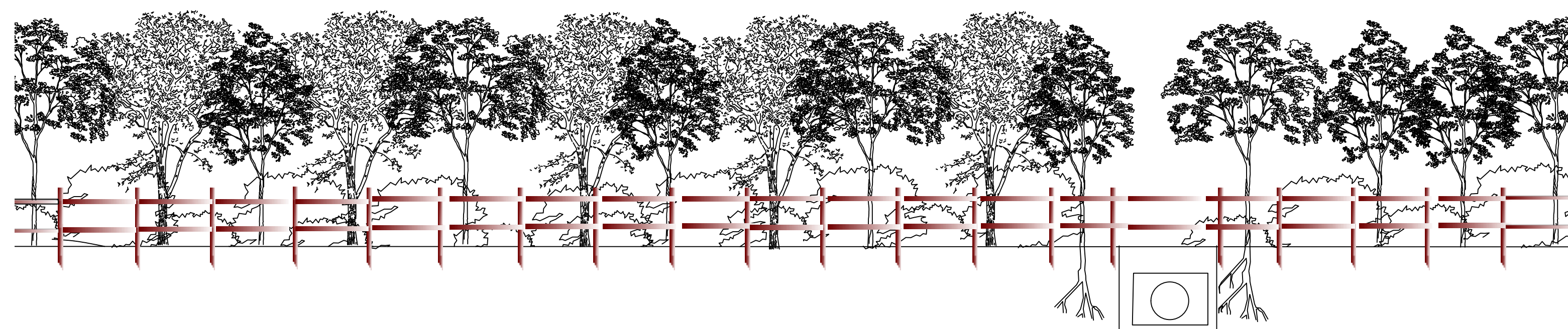


Original jetty positioning adjacent to a boathouse on lake shore



Dipping platform and outdoor classroom. Shelter can extend the time of year school going children participate in educational outdoor activity.

## ZONE K Section



C

C1

Rowan *Sorbus acuparia*, Crab apple *Malus sylvestris*, *Prunus avium*, *Prunus padus* wild cherry and bird cherry can be grown 5m from water pipes. They are also useful pollinators and visually blend the water plant into the landscape

New sitka spruce fencing posts and rails to be erected to secure cattle and prevent their entering the lake-shore. Galvanised or plastic coated sheep wire to be firmly attached to the lake side of the fence reinforcing the stock proof capacity of the fencing system.

Water pipe positions to be identified and deflecting root barrier to be set back from the pipe to ensure tree roots do not enter the pipe network.

Holly, *Ilex aquifolium* can be grown to 2m of the water pipe infrastructure. It is also useful for surrounding habitats and blends the security fence into the landscape.

Project; Lough Bracken  
 Client; Flynn Furney for Meath Partnership  
 Drawing; Masterplan Detail Zone I, Zone J, Zone K  
 Drawing No.; MLBLMP034A  
 Drawn by; GH  
 Scale; Varies 1:500, 1:30, NTS Print A0  
 Date; 22/12/21

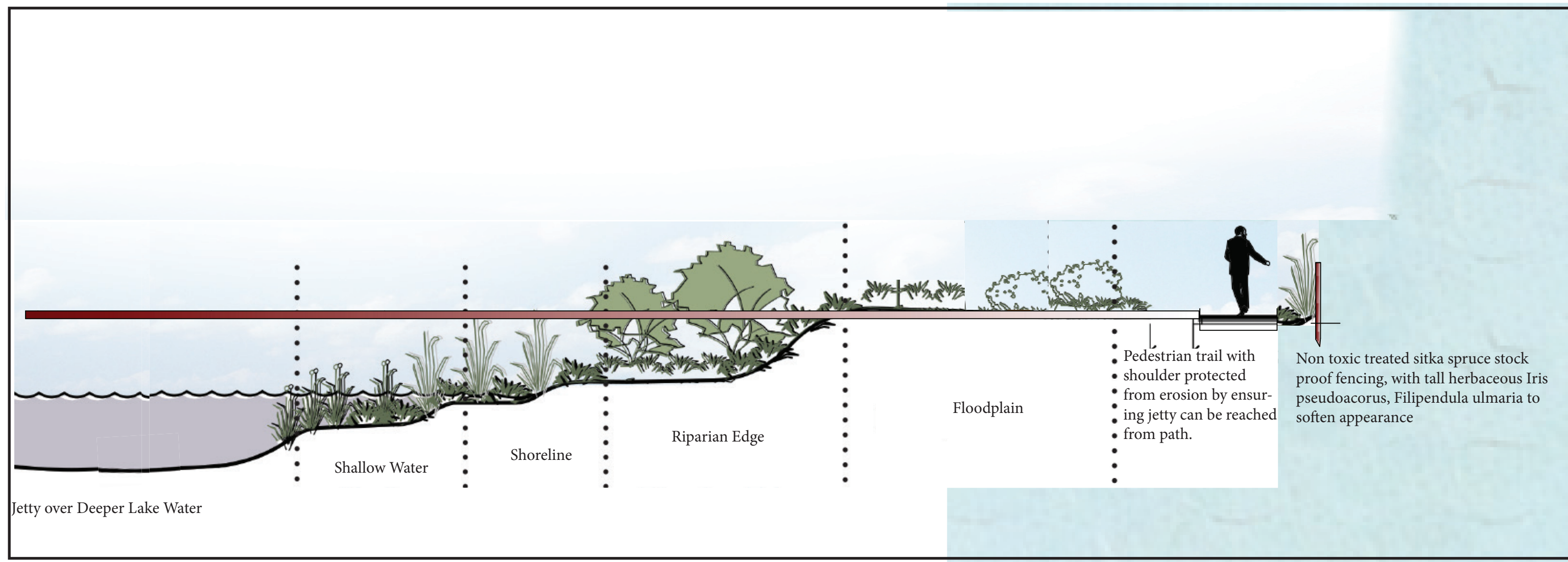
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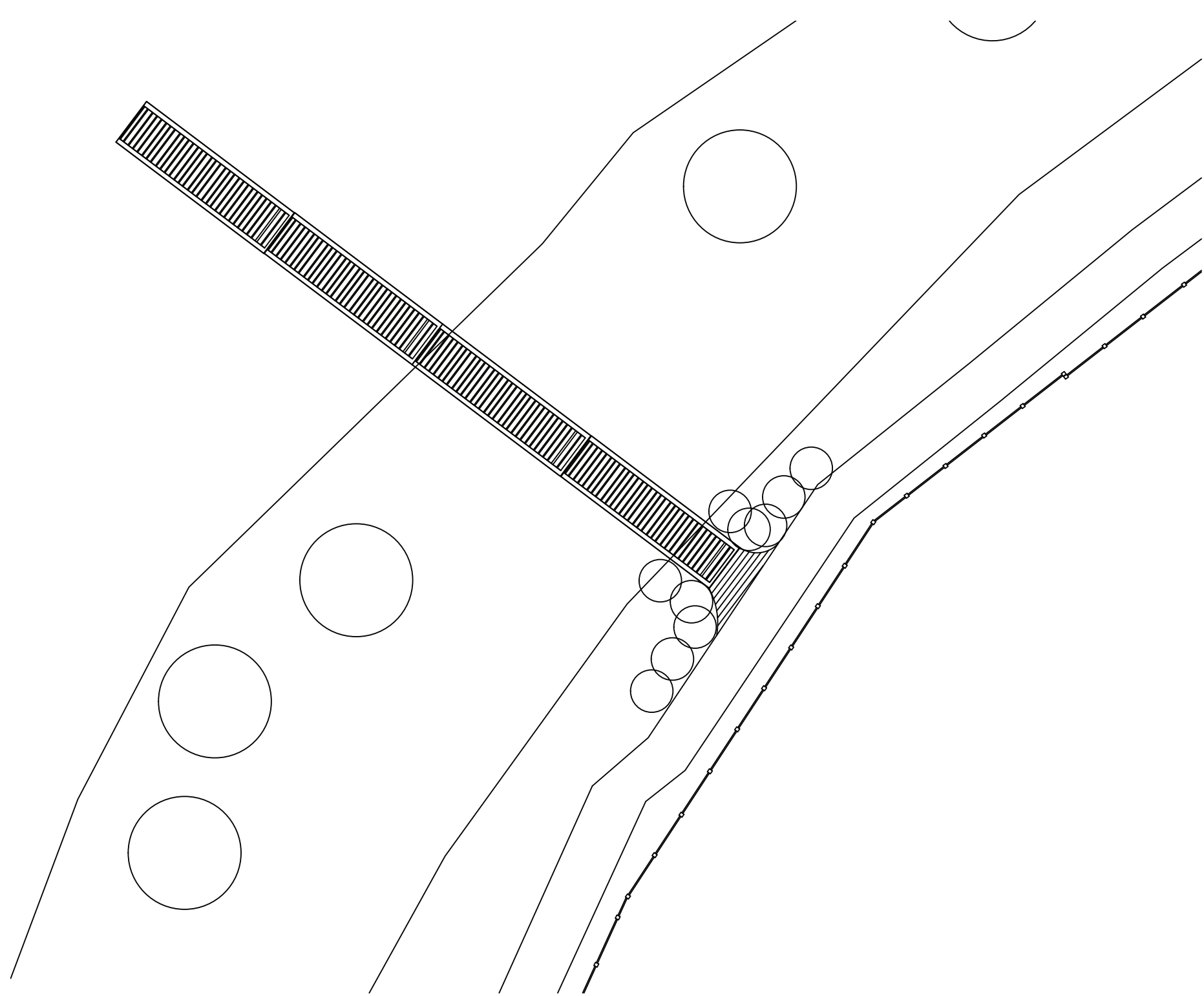
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# Landscape Plan Zone L, M



Long jetty avoiding plant life and allowing a riparian edge to develop.



Generous jetty length will facilitate fishing without the resultant damage on adjacent aquatic vegetation.

6

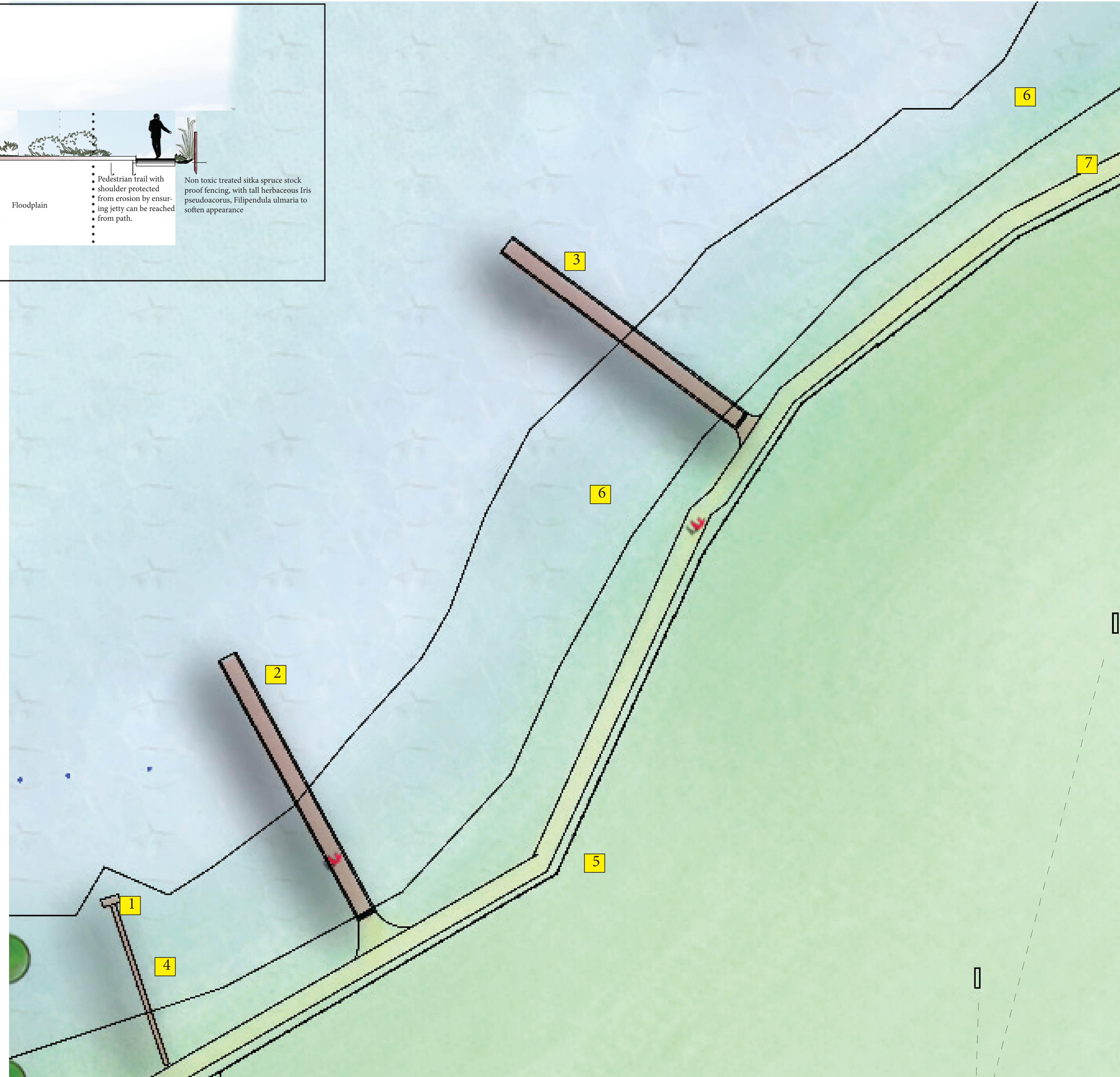


Riparian woodland descending to riparian and aquatic lakeshore plants



Cattle to be fenced off from lakeshore. This will protect the lakeshore and allow a margin of plant life to regenerate which helps reduce sediment and microbes arriving into the lake water.

Floating jetties allow for a good extension of the jetty into the lake clear of aquatic and riparian vegetation.



## Legend

1. Existing fishing stand
2. Additional fishing stand with elongated jetty.
3. Additional fishing stand with elongated jetty.
4. Existing edge planting
5. Sitka spruce post and rail fencing treated with non-toxic timber preservatives safe to use near potential drinking water. This fence to be placed outside path on the hill side, circulating the lake.
6. Existing band of riparian edge vegetation.
7. Path to circulate towards zone N and O. These to be simple gravel paths with filter fabric beneath, capable of enduring occasional flooding. This section of the route circulating the lake will not be of challenging access or universal access trail grade though all information on the trail slopes, conditions, surface materials to be clearly provided at trail heads.



Multiple locations for fishing reduces wear to soils and aquatic and riparian vegetation at popular fishing stretches along the lakeshore



Drinking troughs to be placed at movable sites at least 20m from shore. The use of solar powered pumps allow water to be brought up the slope to troughs at various locations.

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 Client; Flynn Furney for Meath Partnership  
 Drawing; Masterplan Detail Zone L, Zone M  
 Drawing No. ; MLBLMP035A  
 Drawn by; GH  
 Scale ; Varies 1:500, 1:20, 1:30, NTS Print A0  
 Date; 22/12/21

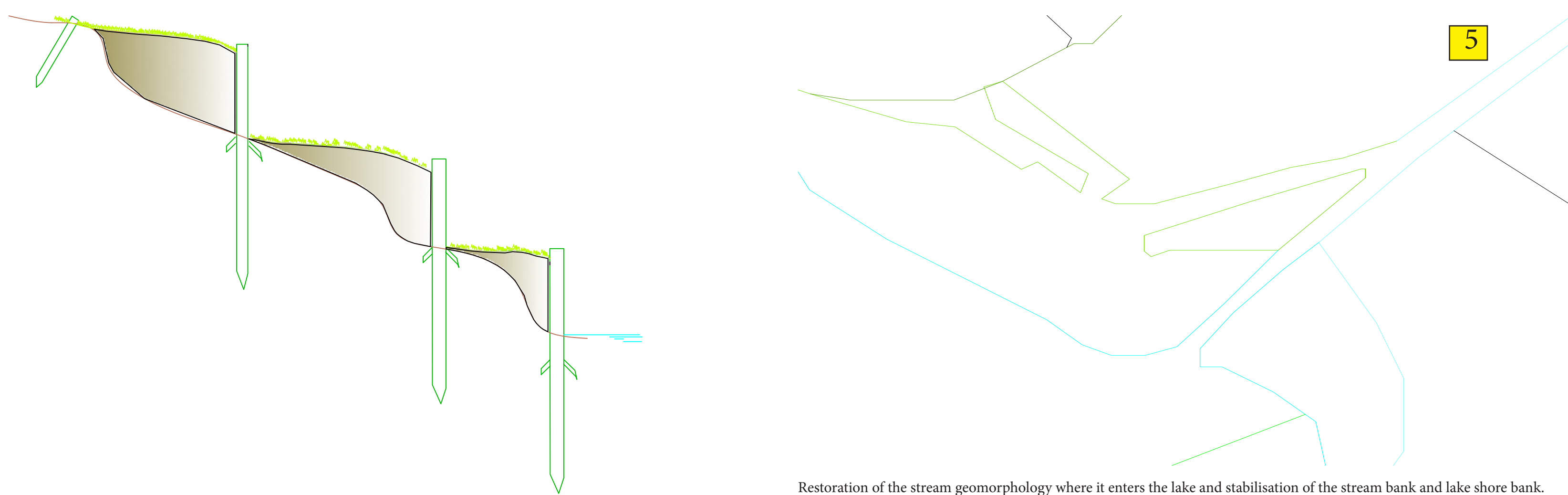
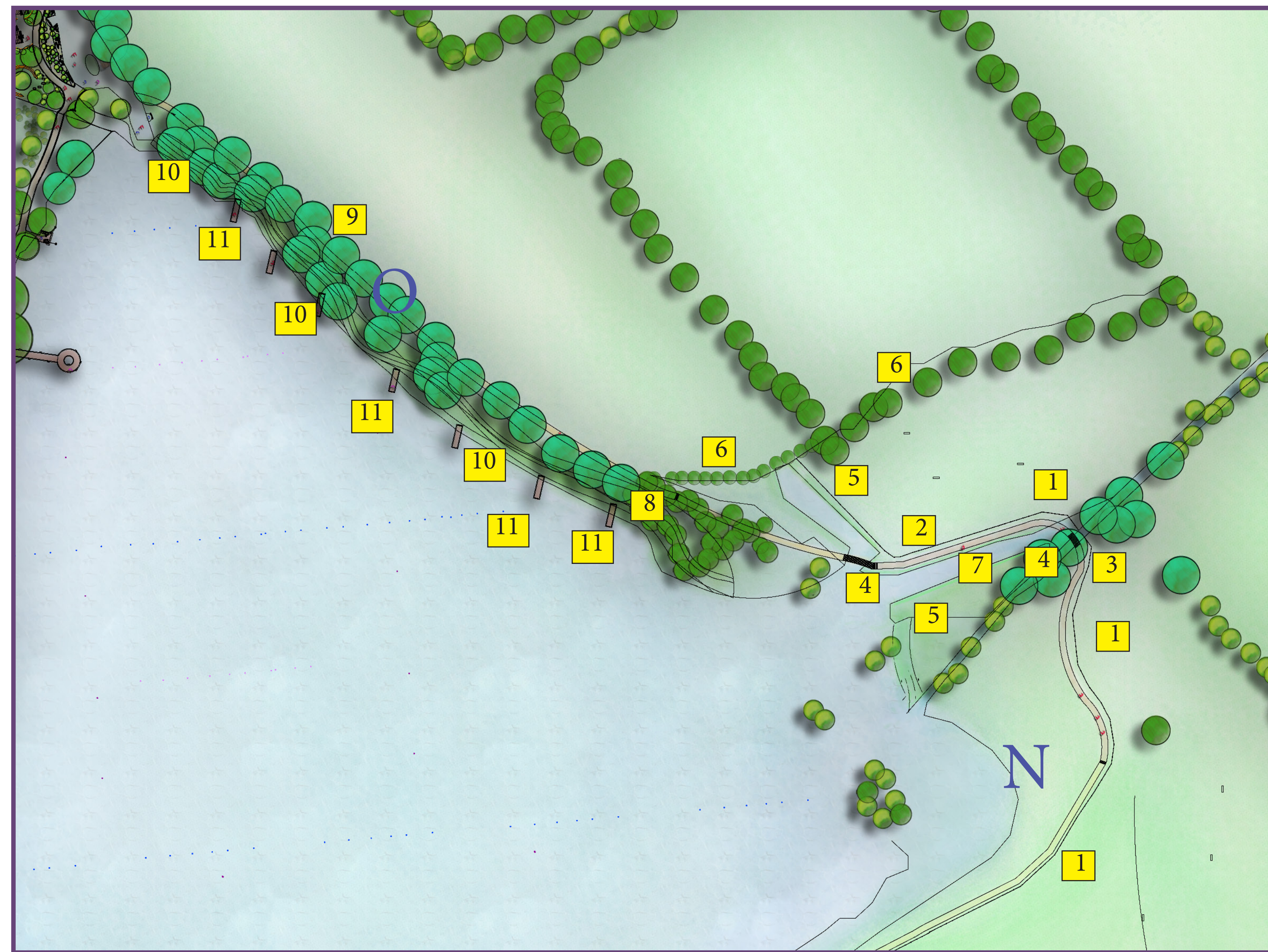
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# Landscape Plan Zone N, O



Typical spiling section showing live willow stakes and rods which are used to retain the banks. Soil is filled in behind to allow the willow to strike and grow and act as a revetment. As the root system grows and develops it retains and strengthens the banks of the lake shore. Additionally the willow itself provides shade in summer to cool the lake water and reduce the capacity for lake algae to photosynthesis and reproduce.

Restoration of the stream geomorphology where it enters the lake and stabilisation of the stream bank and lake shore bank.



Board walks and boardwalk bridges to carry the path over wet occasionally flooded ground. Modified wood or recycled plastic to be utilised along these stretches. Modified wood that is non-toxic and water resistant would be a suitable material providing it is tested for submergence. Kick-plates or tipper boards to trim edges of the boardwalk even though this stretch is not universally accessible. The boardwalk to be trimmed with yellow flag iris and meadowweet is likely to reestablish itself subsequently.

Root protection to be ensured during construction and operation by spreading the load and avoiding compaction at the root system of the hedgerow and hedgerow trees in Zone O. Water and air to be allowed to exchange freely using the geocell system.

Examples of willow spiling on the right, at various stages of construction. As well as revetment willow spiling terraced as seen here improves water safety by reducing the incline of banks to the lakeshore.



## Legend

1. Sitka spruce, non toxic, treated post and rail fencing to separate livestock from the lake shore and to ensure microbes and sediment do not reach the lake.
2. Trail path to vary from a simple gravel path to a modified wood/ recycled plastic boardwalk. The boardwalk to be able to withstand occasional flooding with moderate maintenance.
3. Stock-proof timber stile to allow anglers and pedestrians to navigate this portion of the route without affecting livestock around the lake.
4. Foot bridges to span the streams and ditches.
5. Restoration of the drainage pattern and lake shore geomorphology by reinforcement of same using willow spiling, like Rivus catchment restoration, to retain banks and prevent sedimentation and siltation of the lake. The small island pattern to be restored and utilised to disperse the speed and flow of the water into the lake. This will also restore the pattern of the cultural landscape at this location.
6. The cultural landscape to be restored to return a finely articulated expression of landscape quality to this zone. This will also improve the quality and biodiversity value of adjacent habitats through renewal of connectivity and planting. Hedgerow materials on drier ground to be *Crataegus monogyna*, *Ilex aquifolium*, *Viburnum opulus* with *Quercus petraea* and *Prunus avium* spaced and planted for hedgerow trees. On damper ground willow *Salix* sps. to be used with aspen, *Populus tremula* and alder *Alnus glutinosa*, where space allows and *Betula pendula* to give height. The additional planting at this strategic location will trap silt and sediment before it reaches the lake shore.
7. The boardwalk to run along with a border of the existing stand of *Iris pseudoacorus* and planted *Iris pseudoacorus* propagated from nearby stock with all propagation licenses agreed in advance with National Parks and Wildlife Services and contracted to local nurseries with skilled propagation staff.
8. Where the water level dictates, the board walk ends and the trail along this stretch to be constructed using a cellular confinement system such as Geoweb with 10oz needle punch textile. No more than 200mm if any, of wet soil to be removed from the surface of the trail and load distribution to be used to ensure that the root system of the existing hedgerow and hedgerow trees are protected during both the construction and operational phase of the scheme. Lightest possible machinery to be used (mini diggers). The geocell to have a base liner to filter silt and sediment and to prevent same entering the lake. The geocell to have variable widths according to the path width available without causing damage or removal of trees. Path to be 1000mm-1200mm wide at narrowest point. The cells to be filled with local stone gravel warm beige in colour with final 10mm finish to be 10-12mm dia, gravel in warm beige. This section of path is at a higher elevation to the lake however the geocell system will still allow for occasional flooding.
9. Hedgerow to have a maintenance regimen implemented to allow for its longevity. The hedgerow is to be traditionally laid and infilled with *Crataegus monogyna* where gaps appear over a period of two years with alternate sides being maintained outside of the nesting season.
10. The willow spiling used to reinforce the bank to have a double function by allowing for rescue from a terraced slope with a reduced incline. All finished works to have as built risk assessments carried out by Water Safety Ireland. Fishing stands to have boarding ladders fitted at construction to ensure safest possible outcome from slips trips and falls into the lake water.
11. Increase the number of fishing stands to reduce the risk of erosion and wear. This will also increase water safety. The stands to be secluded from the path to ensure they are most likely to be used solely for fishing or viewing.



Project; Lough Bracken  
 Client; Flynn Furney for Meath Partnership  
 Drawing; Masterplan Detail Zone N, Zone O  
 Drawing No.; MLBLMP036A  
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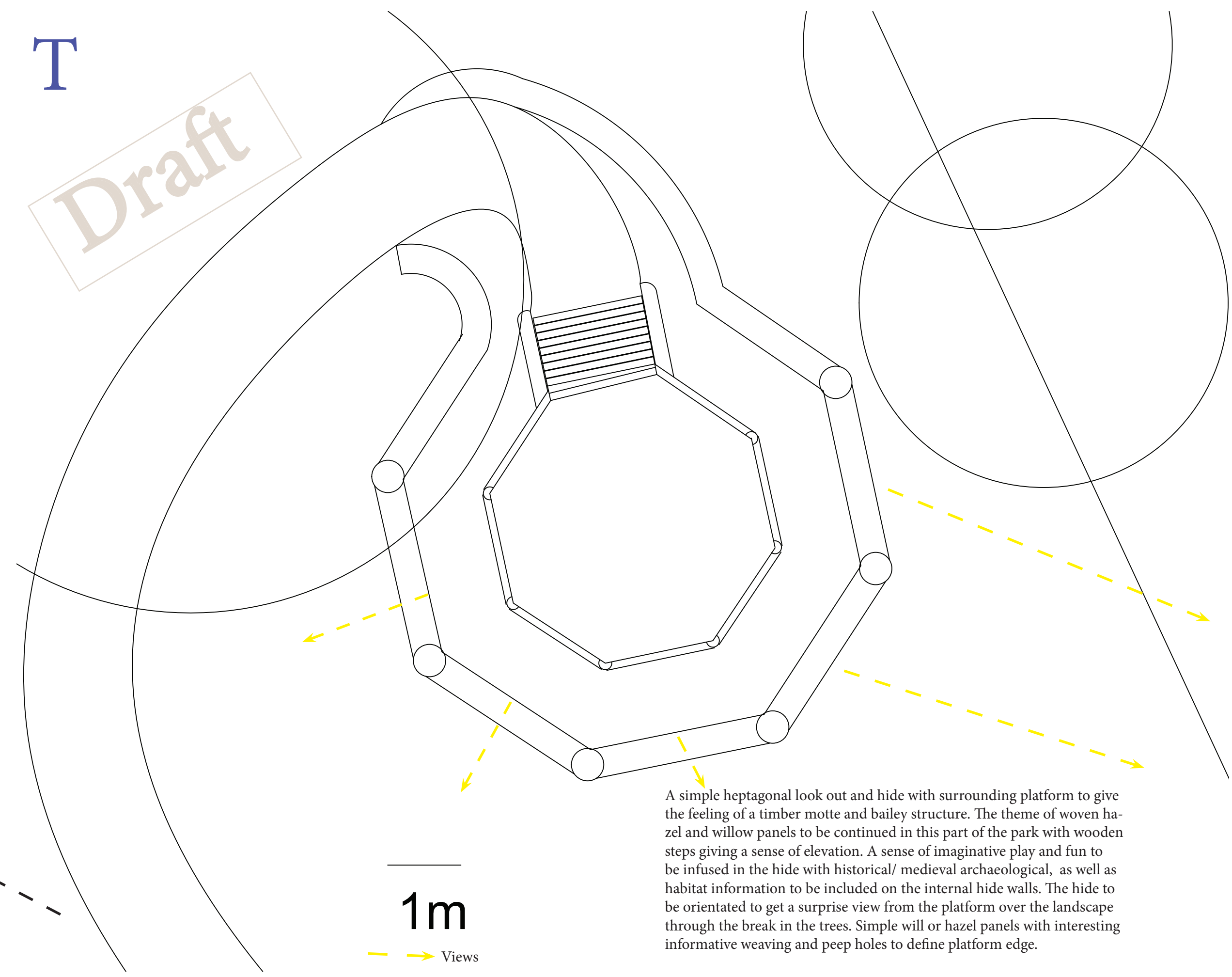
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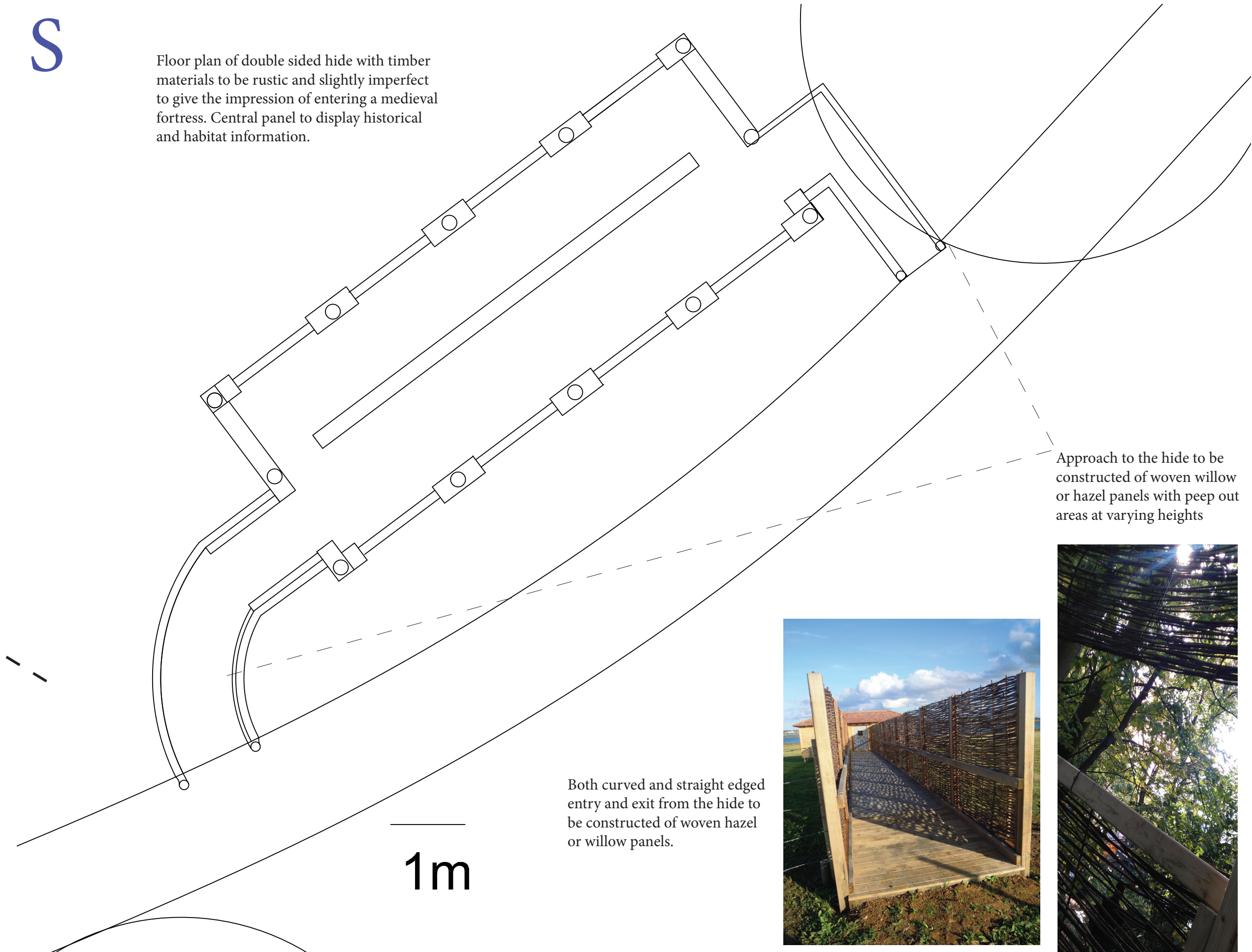
# Landscape Plan Zone P, Q, R, S, T

T



A simple heptagonal look out and hide with surrounding platform to give the feeling of a timber motte and bailey structure. The theme of woven hazel and willow panels to be continued in this part of the park with wooden steps giving a sense of elevation. A sense of imaginative play and fun to be infused in the hide with historical/medieval archaeological, as well as habitat information to be included on the internal hide walls. The hide to be orientated to get a surprise view from the platform over the landscape through the break in the trees. Simple will or hazel panels with interesting informative weaving and peep holes to define platform edge.

S



Floor plan of double sided hide with timber materials to be rustic and slightly imperfect to give the impression of entering a medieval fortress. Central panel to display historical and habitat information.

Approach to the hide to be constructed of woven willow or hazel panels with peep out areas at varying heights

Both curved and straight edged entry and exit from the hide to be constructed of woven hazel or willow panels.

R



Q

The rest area in Zone Q will be important and to have a triangular shape with plenty of trail information also in tactile format to indicate the grade and level of challenge of trail options at this point. For Zone Q and R, information on trail grade, trail length, trail slope and surface materials to be clearly outlined. Natural timber materials to be used to convey trail information and to convey habitat information over the course of the woodland walk

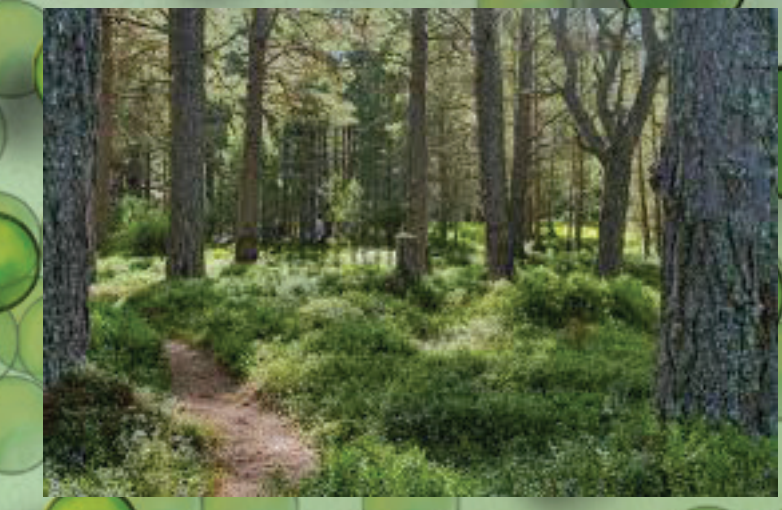


Bark mulch to line the section of the trail that goes through the Scots Pine woodland to the fort of Lough Bracken on the hill top. The edge of the trail is to be defined by simple log posts and low rails. This definition of the trail ensures that wear is minimised and pedestrians stay to the assigned route. The width of the route can be variable with an odd pine tree within the trail.

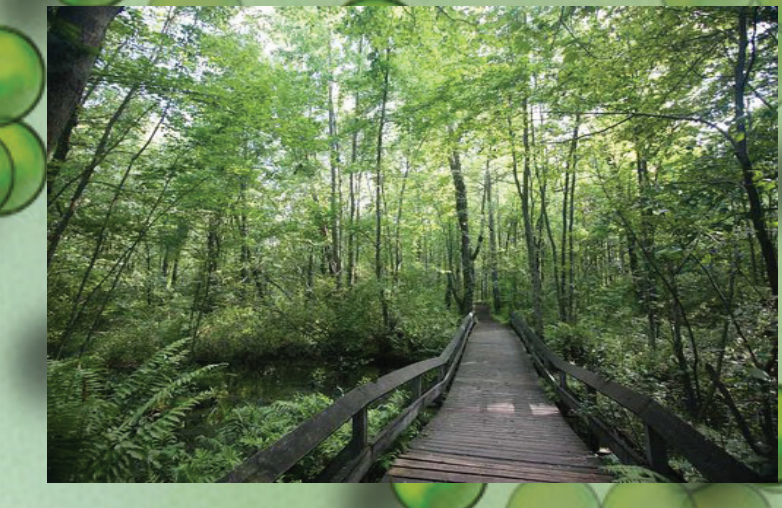
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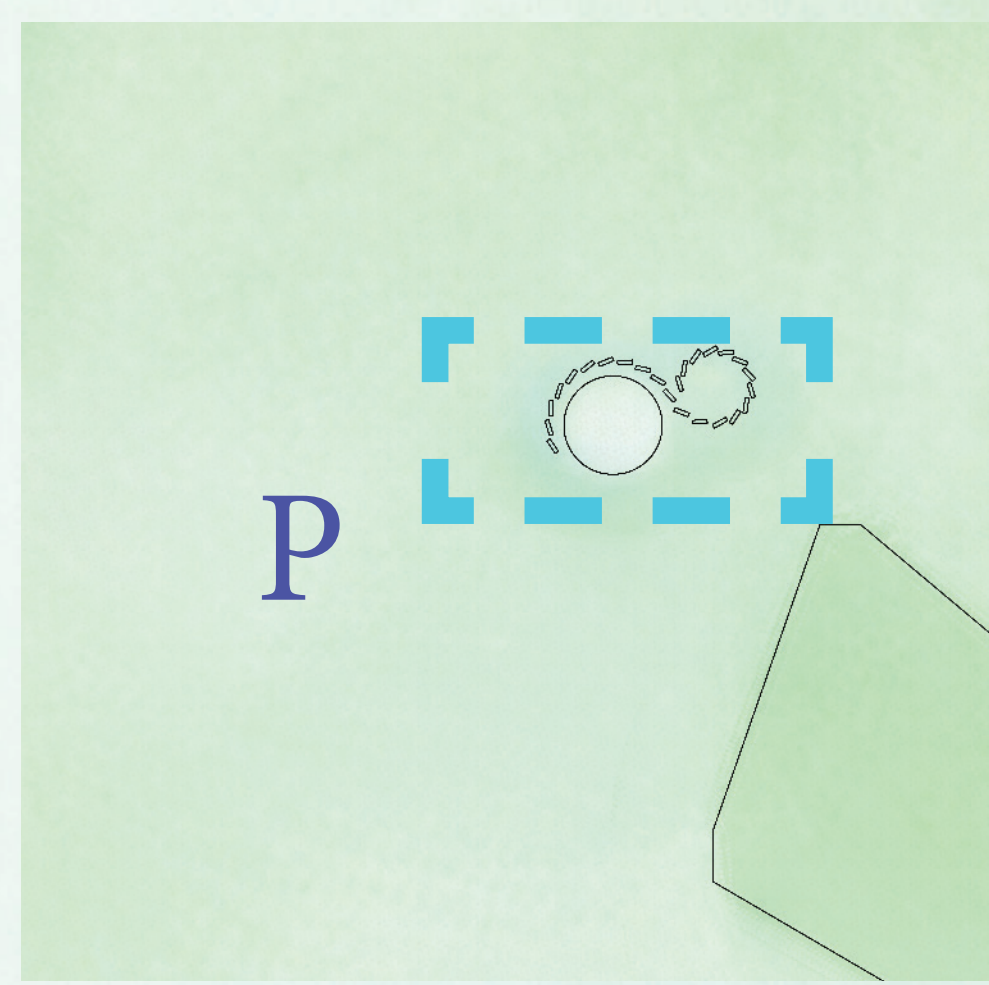
Scott pine woodland trail with interesting woodland floor



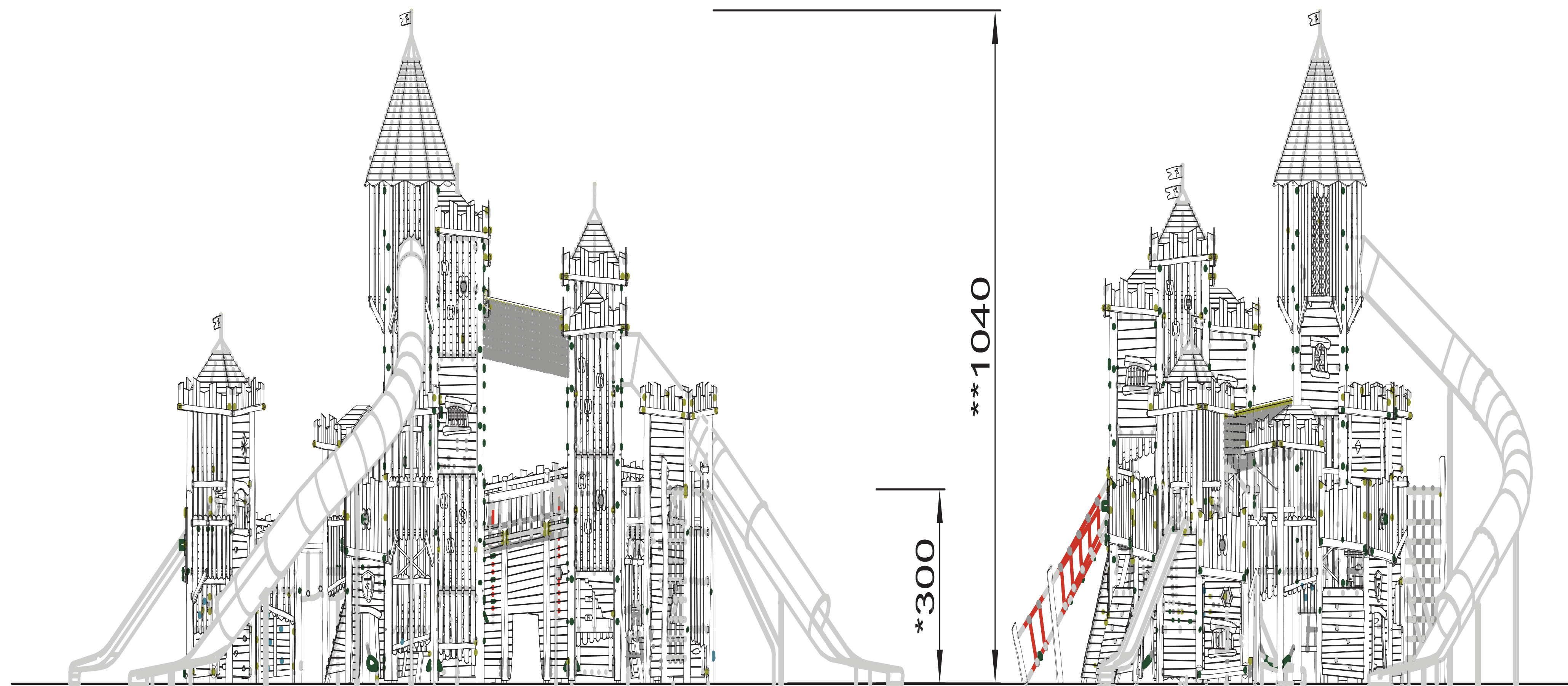
Mixed species woodland trail with simple low timber post and rails defining the trail edge



Zone P An artistic installation to surround and spiral away from the old hill top reservoir. The reservoir to be considered as the site of an artistic installation to improve its appearance and integrate it into the proposed park. The examples below from water tower murals and sculptural installations of a similar scale.



## Nature play - themed playground Sample play system- Medieval Castle



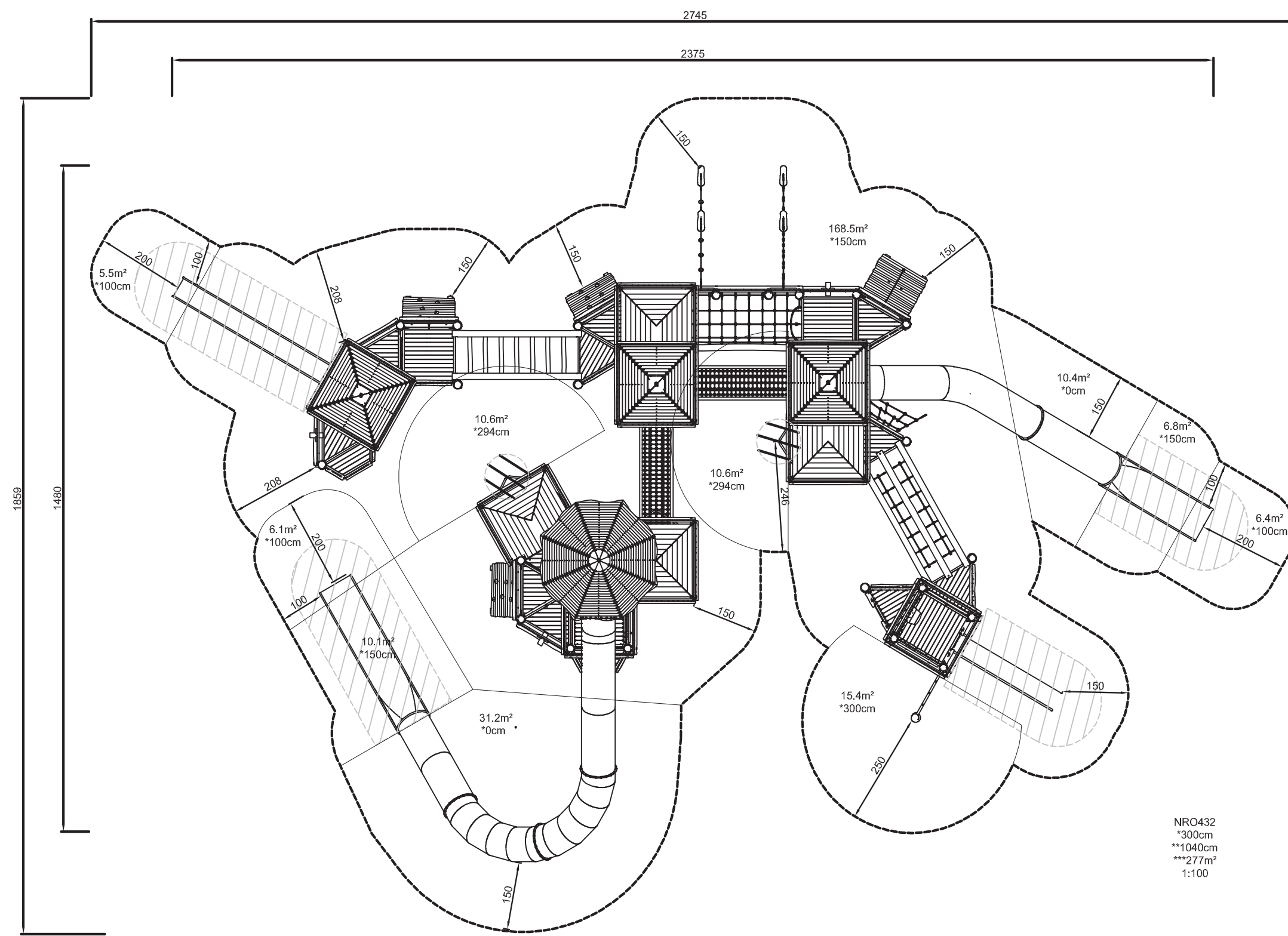
Nature based play emphasises activity that develops agility through climbing sliding etc. Unpainted wood and the medieval theme make a play system such as this appropriate for a woodland setting with a Norman feature within the woodland and forestry complex.

The judicious removal of some forestry trees will make space for the playground whilst leaving carefully chosen selected trees will integrate the play structure seamlessly into the lakeside setting without having a large visual impact on the area. The planting of replacement native, naturalised and deciduous trees around the playground periphery will also ensure that in the years to come a sound ecological frame will wrap itself around the playground simultaneously visually integrating the space for many years into the future.

A selection of trees to be retained and planted within the playground itself to provide shade and a place to position seating.

Many companies are now producing similar play systems which are unpainted and are close in overall appearance to natural wood and rope. They allow children to climb safely to a height that allows for a sense of risk without the exposure to fall. This underpins a child's developing sense of confidence.

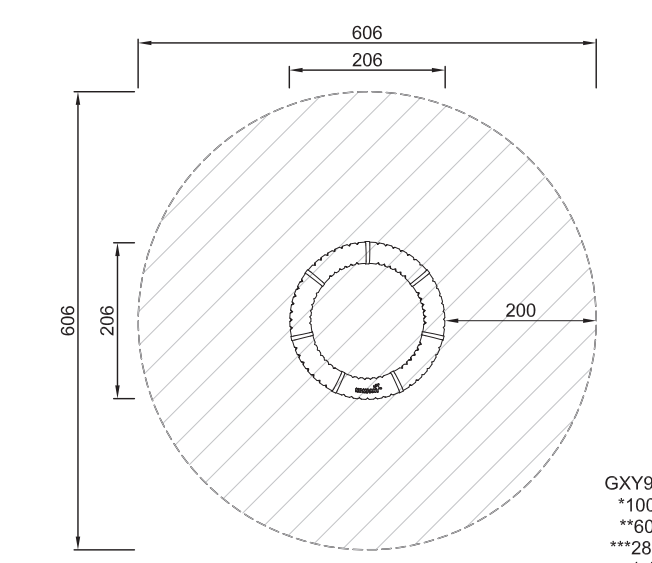
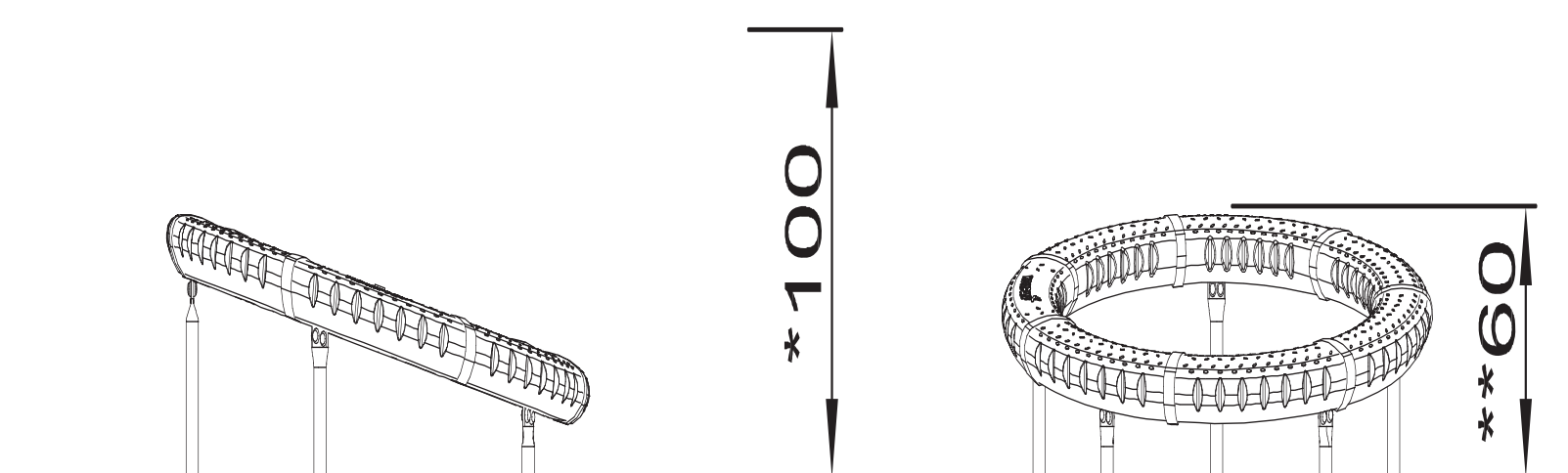
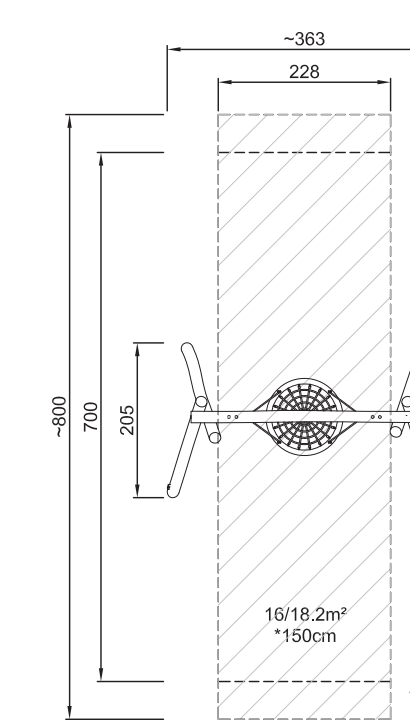
Natural wood play systems integrate a variety of activities and skills development.



Forest boat is made of durable weather resistant natural rosin wood which can accommodate children of all abilities. Pieces such as this can be chosen for themed play.



Various pieces of wheelchair friendly play equipment manufactured by a variety of playground companies, integrated into the play area at the detailed design stage, will ensure that universal access and fun can be enjoyed by all families.



Basket swings present in playgrounds can be used by children of a range of physical abilities. Swings can also be adventurous with extra high swings providing an exhilarating experience. Placed within view of each other, all children feel they are part of the swing experience.



The popular wheelchair trampoline will ensure that children of all abilities can enjoy leaping and bouncing safely.



Many playground companies now manufacture pieces of play equipment that can be used in a variety of ways by all children regardless of ability. These pieces allow children to spend a long time engaged in physical activity as they can be tried out for a variety of uses e.g. spinning, climbing, resting, balancing, socialising etc.

