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THE IRON LINE, MILLOM
REMEDIATION STRATEGY

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Site Address: The Iron Line, Millom, Cumbria, LA18 4LB

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1 INTRODUCTION

This Remediation Strategy has been prepared by Curtins for Cumberland Council (the Client) to provide guidance with respect to the proposed development site known as The Iron Line, Millom, Cumbria, LA18 4LB. Part of the site is a Site of Special Scientific Interest (SSSI), a Ramsar Site, a Special Protection Area and a Special Area of Conservation which comprises RSPB Hodbarrow and land at the southern side of Redhills Quarry (owned by Cumberland County Council).

The site has been split into distinct sections for the purpose of Curtins Assessments, with a building being proposed in the north of the site in the proposed 'Visitors Centre' and predominately civil improvements to ancillary areas in the other zones:

- Zone 1: Visitors Centre
  - Proposed Visitor Centre Building, car parking, roads and infrastructure.
- Zone 3: Towsey Hole Windmill
  - Improvement of existing paths and construction of new paths
- Zone 4: Haverigg Lighthouse & Tern Island Hide
  - Improvement to paths/roads
- Zone 5: Annie Lowther Hide
  - Improvement off existing paths and construction of new paths
- Zone 7: Quarry Hides
  - Improvement to paths/roads
- Zone 8: Iron Line Railway
  - Improvement to paths/roads
- Zone 9: Iron Line Entrance
  - Improvements to paths/roads
- Zone 10: Mainsgate Road Entrance & Hodbarrow Car Park
  - Improvements to paths/road

The main development is proposed in Development Zone 1, where a Visitor Centre building will be constructed. The remainder of the Development Zones will receive some development such as new roads, paths and hides. The locations of the Development Zones are illustrated in Figure 1.



Figure 1 – Site Location Plan with Development Zones, site boundary is shown in red.

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The site has been characterised through a desk-based Phase 1 Geo-Environmental Assessment (Ref. 1), a Phase 2 Ground Investigation for Zone 1 (Ref. 2), a Phase 2 Ground Investigation for Zones 3-10 (Ref. 3) and a Mining Risk Assessment (Ref. 4).

The site comprises RSPB Hodbarrow which covers the majority of the site, and land to the southern side of the Redhills Quarry (Owned by Cumbria County Council).

A sea wall is present bounding the south of the site, extending from east to west. Heritage and historic structures are present such as the Hodbarrow Lighthouse and Hodbarrow Beacon.

There is a large lagoon located within the southeastern portion of the site, with the majority of the site covered by grassland and tree cover. A footpath extending the entire length of the outer sea wall is present, with several footpaths extending into the RSPB Hodbarrow site to the east.

1.1 Requirements of the Remediation Strategy

The Remediation Strategy is to account for the following;

- A description of the materials likely to be encountered by the developer and their contractor/sub-contractors.
- Proposals for excavations with respect to the materials likely to be encountered.
- Summary of risk ratings associated with ground contamination and primary pollutant linkages remaining.
- Recommendations for the specification of imported soils where used in areas of soft landscaping.
- Recommendations for appropriate PPE.
- Recommendations for managing asbestos appropriately during construction.
- Recommendations for re-use of materials and use of a Materials Management Plan (MMP) during earthworks activities.
- Recommendation for provision of a soil contamination and asbestos contamination watching brief during remediation, earthworks & construction works and a strategy for handling potentially contaminative incidents.
- Recommendation for the installation of ground (carbon dioxide and methane) gas and radon gas protection measures.
- Proposals for the verification of remedial measures, including a regime for verification and chemical analysis of imported soils.

1.2 Definitions

In this document the following definitions apply:

Contractor Refers to the appointed contractor responsible for undertaking the remediation works.

Site Manager Refers to a representative of the appointed contractor resident on site.

Engineer Refers to a suitably qualified representative from Curtins, who would not normally be resident on site.

1.3 References

The Remediation Strategy has been prepared with reference to the following existing reports;

- **Reference 1:** Curtins (2023) Phase 1 Preliminary Risk Assessment, The Iron Line, Millom Ref. 080974-CUR-00-XX-RP-GE-001 P03.
- **Reference 2:** Curtins (2025) Phase 2 Ground Investigation, The Iron Line, Millom (Zone 1) Ref. 080874-CUR-XX-XX-RP-GE-00006 P03.
- **Reference 3:** Curtins (2024) Phase 2 Ground Investigation, Millom (Zones 3-10) Ref. 080874-CUR-XX-XX-T-GE-00007 P02
- **Reference 4:** Curtins (2024) Desk Based Mining Risk Assessment, The Iron Line, Millom Ref. 080874-CUR-XX-XX-T-GE-00005 P02.
- **Reference 5:** Curtins (2025) Mining Risk Mitigation Strategy, The Iron Line, Millom Ref. 080874-CUR-XX-XX-T-GE-00009 P02.

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1.4 Other Considerations

1.4.1 Mining

The site was part of Hodbarrow Iron Mine and as such numerous risks have been identified associated with historic mining features. Mining Risks are outside the scope of this report, risk mitigation measures associated with historic mining are detailed under separate Curtins reports as referenced above.

1.4.2 Geotechnical

Ground conditions for the site are complex due to the historical and geographical site setting. Geotechnical risks and recommendations are outside the scope of this report and are detailed under separate Curtins reports as referenced above.

1.4.3 Ecological Considerations

Ecological assessment is outside the scope of Curtins services. Notwithstanding, it is noted that the site is in a sensitive area with respect to ecology. Zone 1 Visitors Centre building site is located within areas of Priority Lowland Meadow habitats, rare species such as Natterjack Toad are known to present along with and nuisance plant species such as Mares Tail also observed on site. The remainder of the site is located within the RSPB and SSSI, RSPB Hodbarrow.

Greengage's Ecological Impact Assessment Reports should be consulted for ecological constraints and construction mitigation measures.

Specialist ecologist advice should be sought for all construction works.

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2 GROUND CONDITIONS

The following sections present a summary of the ground conditions identified during the Curtins intrusive ground investigation(s). Due to the extent of the site and the proposed developments ground conditions have been separated into Zone 1 and Zones 3-10 for Clarity.

2.1 Zone 1 Ground Conditions

Ground Conditions encountered at the Zone 1 Development Site generally comprised of Made Ground deposits overlying cohesive Glacial Till (with localised granular Glacial Till) superficial deposits. Bedrock comprised of the Red Hills Limestone with localised Low Furness Basel Formation conglomerate.

2.1.1 Zone 1: Made Ground

Made Ground was encountered in all exploratory borehole locations from ground level to proven depths ranging between 0.40m and 4.00m bgl (13.00m to 9.40m AOD). The thickness of Made Ground was not proven in all locations.

During the initial ground investigation Made Ground soils comprising of vegetation cover overlying topsoil, with a maximum depth of 0.50m bgl (13.06m AOD), was encountered in all locations, excepting ST 1-02, TP 1-04, CP 1-01, CP 1-01B, CP 1-01C, CP 1-02 and CP 1-03 which recorded surface cover comprised of vegetation overlaying granular Made Ground deposits.

In the additional ground investigation within Zone 1, surface covering encountered comprised brown, very clayey, very gravelly cobbly sand with gravel of slag, coal, limestone, brick and in 1 No. location suspected asbestos cement.

Granular Made Ground was encountered in all exploratory holes across the Zone 1 area, the thickness and composition varied.

Within the footprint of the historic reservoir, Made Ground comprised:

- Dark greyish brown very gravelly sand with cobbles. Gravel comprised glass, ceramic, plastic, metal, rope, mudstone, sandstone, brick, coal and slag. Cobbles include metal, mudstone and bricks.
- Brown sandy gravelly clay with cobbles. The gravel fraction includes mudstone, limestone sandstone and concrete. Cobbles include metal, mudstone and bricks.
- Grey sandy clay.

This general sequence is indicative of backfilled materials and soils within the former historic reservoir (TT 1-01, TT 1-02, TT 1-03, TT 1-04 and DSBH 1-05).

Elsewhere across Zone 1, Made Ground comprised:

- Brown sandy gravelly clay. The gravel fraction includes mudstone, sandstone and brick;
- Greyish brown slightly clayey very gravelly sand. The gravel fraction includes brick, slag, coal, metal, mudstone, sandstone and glass.
- Reddish brown sandy gravel. The gravel includes limestone, mudstone and brick.
- Brown very clayey, gravelly, cobble fine to coarse sand. Gravels comprise of slag, clinker, limestone, glass and coal. Cobbles comprise of limestone.
- Black and grey mottled very gravelly, silty fine to coarse sand. Gravels comprise of slag, clinker, glass coal and steel.

Zone 1 is a recorded BGS and historical landfill site, part of the Red Hills Quarry landfill. Deposited waste is indicated to include inert, industrial, commercial, household, special waste and liquid sludge. Varied Made Ground encountered during the Zone 1 ground investigations may be indicative of ‘landfill’ material, including glass bottles, tyres, scrap metal, cups, ceramics, polystyrene, plastic and suspected asbestos cement sheets along with other suspected ACM.

Made Ground soils within the vicinity of CP1-01 and CP1-01B were confirmed to contain asbestos cement sheets pieces from ground level to a proven depth of 0.90m bgl.

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Made Ground soils containing a fine white ash were identified in CP1-03 from 0.20m to 1.50m bgl. Ash was recorded to make up 20% of the total soil volume.

2.1.2 Zone 1: Superficial Deposits

Cohesive deposits indicative of Glacial Till was encountered in DSBH 1-01, RH 1-01, RH 1-02, RH 1-03, TP 1-01, TT 1-01, TT 1-03 CP1-01C, CP1-02 and CP1-03. The base of the deposit was encountered within the rotary boreholes, however due to the open hole drilling technique, only visual confirmation from chipping returns was possible. The base of the cohesive Glacial Till was confirmed in the cable percussive boreholes with the deposit proven to depths ranging between 9.00m and 15.00m bgl (5.46m to -1.60m AOD).

The Cohesive deposits comprised reddish-brown to brown, mottled grey, slightly sandy slightly gravelly clay, underlain by light brown sandy lightly gravelly clay.

Granular deposits were encountered in RH 1-01, RH 1-02, RH 1-03 and CP1-03. The base of the deposit was encountered within the rotary boreholes, however due to the open hole drilling technique, only visual confirmation from chipping returns was possible. The base of this deposit was confirmed in cable percussive borehole CP1-03 and was proven to a depth of 14.50m bgl (-0.50m AOD).

The Granular deposits comprised reddish brown to brown, slightly gravelly sand, underlain by brown sandy gravel, or Brown gravelly sand. The granular deposits were encountered overlying the bedrock deposits.

2.1.3 Zone 1: Low Furness Basal Formation

Bedrock deposits indicative of the Low Furness Basal Formation were encountered at 18.0m bgl (-4.60m AOD) in RH 1-02. The formation comprised reddish brown conglomerate with lithoclasts of mudstone and sandstone and a reddish brown sand matrix. The base of the deposit was not encountered during the investigation.

The bedrock deposit was logged based on the chipping returns from open hole drilling.

No evidence of broken ground or voids were identified.

2.1.4 Zone 1: Red Hill Limestone Formation

The bedrock underlying the development site is consistent with the Red Hill Limestone Formation encountered as grey limestone.

Bedrocks deposits consistent with the Red Hill Limestone Formation were encountered from depths ranging between 9.00m to 15.00m bgl (5.46m to -1.60m AOD. This deposit was encountered as a grey limestone. The extent of this deposit was not proven during the ground investigation.

2.1.5 Zone 1: Obstructions Encountered

Several obstructions were recorded within the Made Ground during the investigation, within DSBH 1-02, DSBH 1-03, DSBH 1-05, TP 1-02, SA 1-01 and SA 1-03.

The obstructions were recorded DSBH 1-02 at 1.40m bgl (unknown), DSBH 1-03 at 1.80m bgl (tyre), DSBH 1-05 at 4.00m bgl (unknown), TP 1-02 at 1.20m bgl (hard ground, unable to penetrate), SA 1-01 at 1.65m bgl (hard ground, unable to penetrate), and SA 1-03 at 1.00m bgl (hard ground, unable to penetrate).

2.1.6 Zone 1: Groundwater

Groundwater was encountered within the initial ground investigation within DSBH 1-01 at 2.50m bgl, TP 1-02 at 0.65m bgl, TP 1-04 at 1.90m bgl, TT 1-02 at 2.50m bgl, TT 1-2A at 2.50m bgl, TT 1-03 at 2.50m bgl, SA 1-02 at 0.23m bgl, SA1-03 at 0.40m bgl and RH 1-03 at 1.10m bgl. Deep groundwater infiltration within rotary open boreholes could not be noted or monitored due to the use of the air mist technique.

During the additional ground investigation water strikes were recorded within the cohesive Glacial Till at 13.50m bgl (CP1-01C), 6.00m bgl (CP1-02) and 9.40m bgl (CP1-03). An additional groundwater strike was recorded in the granular

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Glacial Till at 14.10m bgl (CP1-03). Groundwater encountered during the additional ground investigation is likely perched water and not representative of an aquifer.

Groundwater levels were monitored during the return monitoring visits, as summarised in *Table 1*:

Table 1 – Groundwater Monitoring Results

Initial Groundwater Monitoring						
Exploratory Hole	**Installation Strata**	**Response Zone m bgl**	**Depth (m bgl)**			
			29/04/24	**14/05/24**	**23/05/24**	**03/06/24**
DSBH 1-01	Made Ground	1.00 – 2.00 (12.75 – 11.75)	DRY	DRY	DRY	DRY
DSBH 1-02	Made Ground	0.50 – 1.00 (13.97 – 13.47)	1.00	0.75	1.01	DRY
DSBH 1-03	Made Ground	0.80 – 1.80 (12.47 – 11.47)	1.50	1.50	1.36	1.49
DSBH 1-05	Made Ground	1.00 – 2.00 (14.75 – 13.75)	DRY	DRY	2.71	DRY
Additional Groundwater Monitoring						
Exploratory Hole	**Installation Strata**	**Response Zone m bgl**	**Depth (m bgl)**			
			09/01/2025		**22/01/2025**	
DSBH 1-01	Made Ground	1.00 – 2.00 (12.75 – 11.75)	DRY		DRY	
DSBH 1-02	Made Ground	0.50 – 1.00 (13.97 – 13.47)	0.91		DRY	
DSBH 1-03	Made Ground	0.80 – 1.80 (12.47 – 11.47)	DRY		DRY	
DSBH 1-05	Made Ground	1.00 – 2.00 (14.75 – 13.75)	DRY		DRY	
CP1-02	Glacial Till	6.00 – 8.00 (8.46 – 6.46)	0.99		1.08	
CP1-03	Glacial Till	8.00 – 11.00 (6.00 – 3.00)	4.31		4.29	

2.1.7 Zone 1: Observed Potential Contamination

The following visual or olfactory contamination was observed during the investigation within the Made Ground deposits in *Table 2*:

Table 2 – Summary of Visual or Olfactory Contamination

Exploratory Hole	Installation Strata	Depth of observed contamination m bgl	Description
TT 1-02	Made Ground	2.50	Perched water strike with fast infiltration rate and a greenish brown colour. No odour noted.
TT 1-02A	Made Ground	2.50	Perched water strike with fast infiltration rate and a greenish brown colour. No odour noted.
TT 1-03	Made Ground	2.50	Perched water strike with fast infiltration rate and a greenish brown colour. No odour noted.
SA 1-02	Made Ground	0.24 – 1.50	Slight sulphur smell
TP 1-04	Made Ground	0.20 – 1.90	Slight sulphur smell
CP1-01	Made Ground	0.30 – 0.40	ACMs observed in Made Ground

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Exploratory Hole	Installation Strata	Depth of observed contamination m bgl	Description
CP1-01B	Made Ground	0.70 – 0.80	ACMs observed in Made Ground

Varied anthropogenic constituents associated with infilled land were also noted throughout Made Ground soils as discussed in Section 2.1.1.

2.2 Zones 3 – 10 Ground Conditions

Ground Conditions encountered in Zones 3 – 10 generally comprised Topsoil and/or Made Ground overlying cohesive and granular superficial deposits, with bedrock deposits encountered within 2 No. locations only.

2.2.1 Zones 3 – 10: Topsoil

Topsoil was encountered within 4 No. window sample borehole locations (DSBH 3-01, DSBH 5-01, DSBH 5-02 and DSBH 7-02), 3 No. hand pit locations (HP 3-01, HP 3-03 and HP 4-01), 2 No. soakaway trial pit locations (SA 3-01 and SA 3-02), and 4 No. CBR locations from ground level to a maximum depth of 1.35m bgl.

Topsoil encountered in Zones 3 – 10 generally comprised of grass or vegetation over dark brown gravelly sand, or reddish brown/dark brown, slightly sandy, slightly gravelly to gravelly clay with occasional cobbles. Gravel typically comprised of mudstone, limestone, sandstone, quartzite, coal, slate, brick, twigs and occasional clinker. Occasional cobbles of limestone. Not all gravel constituents were encountered in each location.

2.2.2 Zones 3 – 10: Made Ground

Made Ground was encountered within 2 No. window sample locations (DSBH 5-01 and DSBH 7-01), 2 No. hand pit locations (HP 3-02 and HP 4-01) and 11 No. CBR locations from between ground level and 0.22m bgl, with a maximum unproven thickness of 0.98m.

A surface covering of tarmac was encountered within DSBH 7-01, CBR 7-01, CBR 8-01, CBR 8-02 and CBR 10-01 from ground level to depths of between 0.05m and 0.06m bgl.

Cohesive Made Ground was encountered within HP 3-02 and HP 4-01 with thicknesses ranging between 0.05m and 0.35m, described as reddish-brown gravelly clay with occasional cobbles; yellowish brown and brown mottled slightly sandy slightly gravelly clay; and as dark brown slightly sandy gravelly clay with occasional cobbles. Gravel comprised slag, clinker, broken glass, brick, concrete and limestone, with cobbles comprised slag and brick. Not all gravel constituents were encountered in each location.

Granular Made Ground was encountered in DSBH 5-02 beneath topsoil, comprising light orangish/pinkish brown sand and dark purplish brown clayey gravelly sand with rare cobbles, gravel comprised limestone, coal and clinker with a thickness of 0.70m; and in DSBH 7-01 immediately underlying a tarmac surface covering, described as dark brown and black cobbly gravelly fine to coarse ashy sand, with gravel of brick, limestone and tarmac with cobbles of brick; and as black ashy gravelly fine to coarse sand with gravel of brick and coal, with a thickness of 0.90m.

2.2.3 Zones 3 – 10: Superficial Deposits

Cohesive deposits indicative of Glacial Till was encountered from depths of between 0.05m to 1.68m bgl in DSBH 5-02, DSBH 7-01, DSBH 7-02, HP 3-01, HP 3-02, HP 3-03, CBR 10-01 and CBR 10-02, with thicknesses of 0.90m (proven thickness) to 4.86m (unproven final thickness).

Cohesive superficial deposits generally comprised firm to stiff, reddish brown/yellowish brown/brownish grey/brown slightly sandy slightly gravelly to very gravelly clay with occasional cobbles. Gravel of limestone, mudstone and siltstone, with cobbles of limestone.

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Granular deposits indicative of Glacial Till was encountered from depths of between 0.07m to 1.35m bgl in DSBH 5-02, DSBH 7-01, HP 3-03, CBR 5-01 and CBR 9-02, with thicknesses of 0.20m (proven thickness) to 2.00m (unproven final thickness).

Granular superficial deposits comprised medium dense light orangish/pinkish brown/reddish brown/cream/yellow slightly gravelly fine to coarse sand. Gravel of limestone and mudstone. Not all gravel constituents were encountered in each location.

2.2.4 Zones 3 – 10: Red Hill Limestone Formation

Bedrock weathered to a 'Residual Soil', indicative of the Red Hill Limestone Formation was encountered within DSBH 3-01, SA 3-01 and SA 3-02 only in Zone 3.

It was encountered in DSBH 3-01 and SA 3-02 from a depth of 0.13m to 0.21m bgl, comprising firm reddish brown slightly sandy gravelly to very gravelly clay with cobbles of limestone; and as a reddish brown clayey gravelly cobbly boulders of limestone, with gravel and cobbles of limestone.

Slightly more competent bedrock was encountered within SA 3-01 from a depth of 0.14m bgl, comprising light grey and reddish-brown limestone.

2.2.5 Zones 3 – 10: Existing Foundations

Two foundation hand pits were undertaken to understand the foundations of existing structures on site, in Zone 3 (Towsey Hole Windmill) and Zone 4 (Haverigg Lighthouse).

The foundation hand pit undertaken in Zone 3 (HP 3-01) encountered the foundation of the Towsey Hole Windmill, comprising larger bricks at the base of the brick structure at 0.39m bgl, formed on firm orangish-brown clay.

The foundation hand pit undertaken in Zone 4 (HP 4-01) encountered what is assumed to be the foundation of the Haverigg Lighthouse, comprising a metal base which is projected at 0.70m from the metal structure, at 0.51m bgl. The base of the foundation was not encountered due to groundwater ingress.

2.2.6 Zones 3 – 10: Obstructions Encountered

Obstructions were recorded within DSBH 5-01 in Zone 5 only, at 1.20m bgl as hard compacted ground comprising of gravel and cobbles of slag and clinker.

2.2.7 Zones 3 – 10: Groundwater

Groundwater was encountered within HP 4-01 in Zone 4 only, at 0.15m bgl, likely representing perched water.

2.2.8 Zones 3 – 10: Observed Potential Contamination

Varied anthropogenic constituents were noted throughout Made Ground soils in Zones 3 – 10 as detailed in Section 2.2.2.

No further visual or olfactory contamination was observed during the ground investigation within Zones 3 – 10.

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3 GROUND & GROUNDWATER CONTAMINATION

3.1 Ground Contamination

3.1.1 Zone 1: Ground Contamination

A total of 18 No. soil samples were collected within Zone 1. The chemical analysis suite included a broad range of potential contaminants of concern including heavy metals and non-metals, cyanide, PAHs (USEPA 16), TPHs and asbestos in 13no. samples and asbestos only in 5no. samples.

The proposed use of the site was identified to be analogous with a Commercial scenario. Commercial Generic Assessment Criteria (GAC) were utilised for an SOM of 2.5% for all the samples has been adopted for a Commercial end-use. No recorded exceedances above the adopted GACs were identified in Zone 1.

All soil samples were screened for asbestos, with 7 No. positive identifications obtained. Two bulk cement sheets were recorded within the shallow Made Ground soil of CP 1-01 and CP 1-01B and were screened for asbestos. The results of asbestos screening and quantification within Zone 1 are summarised in *Table 3*:

Table 3 – Positive Asbestos Identification

Location	Depth (m bgl)	Type	Matrix	Asbestos in soil Quantification (%)	Asbestos Bulk Fibre Quantification (%)
TP 1-03	0.40 – 0.50	Chrysotile	Loose Insulation	<0.001	-
TP 1-04	0.10 – 0.20	Chrysotile	Loose Fibres	<0.001	-
DSBH 1-01	0.20 – 0.30	Amosite	Loose Insulation	0.038	-
DSBH 1-03	0.30 – 0.40	Chrysotile	Cement	0.513	-
CP1-01	0.30 – 0.40	Chrysotile	Cement	0.087	-
CP1-01	0.30 – 0.40	Chrysotile	Cement	-	15
CP1-01B	0.70 – 0.80	Chrysotile	Cement	-	15

3.1.2 Zone 1: Groundwater Contamination

1no. groundwater sample was taken in August 2025 from a cable percussive borehole installed within the cohesive Glacial Till.

The results of laboratory analysis of groundwater were assessed against the UK Drinking Water Standards (DWS) due to the presence of a Secondary A Aquifer underlying the site. In the absence of UK DWS, a comparison against WHO standards has been used.

With respect to the underlying Secondary A Aquifer no exceedances are noted within the groundwater sample collected.

The results of the environmental testing can be referred to in Appendix D.

Discussion

The site is underlain with a Secondary A aquifer with the Red Hill Limestone bedrock deposits, the top of these deposits was recorded at between 9m and 15m bgl. Bedrock deposits indicate of Low Furness Basal formation were recorded in one location at 18m bgl, this is also recorded as a Secondary A aquifer.

Glacial Till deposits were recorded overlying, which are a designated a Secondary Undifferentiated Aquifer. Glacial Till deposits were predominantly cohesive, recorded as a reddish brown mottled ,slightly sandy slightly gravelly clay, some granular deposits were recorded underlying.

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Made Ground deposits were of up to 4.00m thickness, overlying superficial deposits. Made Ground deposits were variable including granular and cohesive soils with variable quantities of anthropogenic materials reflecting the historic uses of the site.

Based on the CSM, the risk to groundwater (Secondary A aquifer) was considered to be Low, specifically in consideration of:

- The significant thickness of cohesive superficial Glacial deposits, anticipated to have a low infiltration potential. This will limit downward migration of any leachable contamination within the made ground deposits.
- No evidence of gross or free phase contamination encountered within the made ground deposits.
- Limited groundwater was recorded generally through the monitoring period. Development works will act to improve quality of upper soils and will increase hardstanding cover therefore limiting potential leaching of contamination.
- The quality of groundwater in the wider area is likely to reduced as a result of extensive mining legacy.
- The Registered Landfill site of Redhills quarry covers a large area, predominantly off site to the north. Risk is likely to be greater off-site within the former quarry where superficial deposits have been removed. Again this could impact the wider groundwater quality.

The results of the groundwater sampling confirm the Conceptual Site Model; groundwater obtained from within Glacial Till deposits does not contain contaminant concentrations above relevant screening criteria. As such there is no evidence of contaminants leaching from site soils into the superficial deposits or else the underlying bedrock which is further protected by this aquitard.

On this basis the risk to the underlying Secondary A aquifer is concluded to be **Low**.

Notwithstanding, it was noted that piled foundations for the new building could increase risk to the aquifer through driving of contaminants down through impermeable superficial soils, and or creating preferential pathways for contaminant migration. It was recommended that a piling risk assessment to ensure this risk is sufficiently considered and mitigated.

3.1.3 Zones 3 – 10: Ground Contamination

A total of 7 No. soil samples were collected within Zones 3 – 10. The chemical analysis suite included a broad range of potential contaminants of concern including heavy metals and non-metals, cyanide, PAHs (USEPA 16), TPHs and asbestos.

The proposed end use of the site was identified to be analogous with a *Commercial* end-use scenario. *Commercial* GAC was utilised for an SOM of 2.5% for weathered bedrock deposits, and 6% for Made Ground and Topsoil soils. With respect to the proposed *Commercial* end use, soil chemical analysis results recorded 1 No. exceedance.

Table 4 – Table of Exceedances

Location	Depth (m bgl)	Determinant	Concentration	GAC
HP 4-01	0.40	Lead	10,600	2,300

The exploratory hole log for HP 4-01 describes the Made Ground as containing gravel and cobbles of slag material (waste byproduct from the smelting process), which may explain the high exceedance of lead. The Development Plan (*Appendix A*) for Zone 4 where the anomalous lead exceedance was recorded is shown to comprise hardstanding surface changes and improvements, which would break the pathway between the source (Made Ground) and the receptor (Visitors to Site).

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All soil samples were screened for asbestos, with 1 No. positive identification in Zone 7 obtained, the results of which are in Table 5.

Table 5 – Positive Asbestos Identification

Location	Depth (m bgl)	Stratum	Type	Matrix	Asbestos in soil Quantification (%)
DSBH 7-01	0.20	Made Ground: dark brown and black cobbly, gravelly sand	Chrysotile	Textile	1.158

This ACM was identified below the existing tarmac within a granular Made Ground stratum. The Development Plan (*Appendix A*) for Zone 7 where the positive asbestos identification was encountered shows that future development comprises hardstanding surface changes and improvements only, breaking the pathway between the source (Made Ground) and the receptors (Visitors to Site). No soft landscaping changes are proposed in this Zone.

It should be noted that there are two outstanding areas (Zone 5 and Zone 7) that have not previously been characterised following the relocation of two bird hides in updated development plans. It is recommended that further ground investigation is undertaken in these areas in order to adequately characterise the ground conditions.

3.2 Ground Gas

To characterise the site's ground gas regime and validate the qualitative assessment of ground gas risk standpipe installations were incorporated within four window sample borehole locations within Made Ground and two cable percussive borehole within Glacial Till, all within Zone 1.

A total of six monitoring visits have been completed in Zone 1 combining the Initial Phase 2 Ground Investigation, and the additional Ground Investigation. The initial ground investigation proposed a programme of four monitoring visits over two months, These visits were undertaken between 29th of April and 30th of May 2024, with barometric pressure recorded between 998 mb and 1007 mb. Monitoring visits were undertaken during rising, falling, and steady atmospheric pressure conditions. A further two monitoring visits were undertaken between the 9th and 22nd of January 2025, following additional ground investigation works. During the additional monitoring period atmospheric pressure ranged between 1001mb and 1005mb with visits undertaken during rising and falling atmospheric conditions. It is considered that a representative dataset has been obtained.

Methane concentrations were recorded below the limit of detection of the monitoring instrument throughout the monitoring period in all locations within Zone 1.

Maximum Carbon Dioxide concentrations were recorded at 6.1% in DSBH 1-05 on the third monitoring visit.

Carbon Monoxide and Hydrogen Sulphide were recorded below the limit of detection in all wells throughout the monitoring period.

The greatest peak air flow rate was recorded in DSBH 1-01 at -27.7 l/hr on the third monitoring visit however, this instantly reduced to <0.1l/hr. Steady state air flow rates recorded during the monitoring period remained at <0.1 l/hr within all boreholes.

Accounting for a maximum steady state air flow rate of <0.1 l/hr and maximum carbon dioxide concentrations of 6.1% $^{v}/_{v}$ (DSBH 1-05), the worst case Q_{hg} for carbon dioxide for the Made Ground is taken as 0.0061 l/hr and 0.0273l/hr for natural soils. This corresponds with a CS-1 classification, however accounting for the elevated concentrations (>5% $^{v}/_{v}$) recorded in this monitoring well throughout the monitoring period, and the potential local sources of ground gas identified, it is recommended that the characteristic gas regime classification is increased to CS-2, requiring gas protection measures.

The worst-case gas regime at the site is taken as CS-2, and on this basis gas protection measures will be required for the proposed development.

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The potential risks from ground gases to the excavations are to be dealt with by the Contractor, in accordance with the Confined Space Regulations, during construction. Appropriate ground gas monitoring and safety measures should be in place during the works, as the potential presence of ground gases could pose a risk in any confined spaces of deep excavations.

3.2.1 Radon

Radon Mapping confirms that the site is within a Radon Affected Area where 10 – 30% of homes are to be at or above the Action Level.

A BGS Radon Report obtained as part of the Phase 2 Ground Investigation Report for Zone 1 (Ref. 2) indicates that Full Radon Protection Measures are required for the New Visitors Centre Building.

3.3 Groundwater

No evidence of gross or free phase contamination was found within the ground investigation.

Monitoring wells installed in window samples within the proposed Zone 1 building footprint were recorded as dry or have very little water throughout the monitoring period.

Significant cohesive deposits are present overlying the granular deposits acting as a potential barrier to vertical migration.

Groundwater in the area is likely to be of reduced quality and sensitivity due to the historic mining legacy.

Due to the above, no groundwater samples were obtained.

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4 CONCEPTUAL SITE MODEL

Conceptual Site Models (CSM) for the site have been developed as part of the Curtins site investigation(s) that were undertaken at the site and considered based on the current works proposed, separated into Zone 1 and Zone 3 – 10 for clarity.

The CSMs detail a number of pollutant linkages at the site, however, based on the risk assessments undertaken, the potential contaminant linkages (PCLs) listed in *Table 6 and 7* were identified as requiring remediation to enable the safe re-development of the site.

*Table 6 – **Zone 1:** Potential Contaminant Linkages*

PCL	Sources	Receptor	Risk	Potential Pathway	Remediation Recommended
1	Asbestos within Made Ground: 5 No. Positive identifications of asbestos fibres with quantifications of <0.001 to 0.513% and 2 No. bulk asbestos cement sheets observed within shallow Made Ground soils with quantifications of 15%.	**Construction Workers**	**Moderate**	Direct contact, inhalation of asbestos within soil or soil derived dust, or asbestos containing materials.	Appropriate PPE to be provided to construction and maintenance workers. Asbestos Management Plan with input from an asbestos specialist during construction works due to the presence of Asbestos Fibres and Bulk Asbestos identified within Made Ground Soils. Asbestos containing materials to be picked and removed from site, namely the Asbestos Cement Sheets pieces encountered in shallow Made Ground in the vicinity of CP 1-01 and CP 1-01B. Should unexpected contamination be observed during demolition/ construction, works should be stopped with advice obtained from an appropriate specialist.
2		**Future Site Visitors and Maintenance Workers**	**Moderate**	Direct contact, inhalation of asbestos within soil or soil derived dust, or asbestos containing materials.	Zone 1 is anticipated to comprise a Visitors Centre Building along with associated carparking and soft landscaping. Due to the Asbestos Fibres and Bulk Asbestos identified within Made Ground soils, installation of a clean, engineered capping layer is required in areas of soft landscaping. Clean service corridors should be constructed. Clean imported fill to be used to backfill around services.
3	Elevated concentrations of Carbon Dioxide (>5%) identified within Made Ground soils.	**Future Site Visitors and Maintenance Workers**	**Moderate/ Low**	Vertical and horizontal migration through the Made Ground soils.	No mine gases were identified during monitoring of the open-hole boreholes. Visitors Centre Building Zone 1 has been assessed as CS-2, requiring ground gas protection measures
4	Radon Affected Area, 10 – 30% of homes at or above the Action Level	**Future Site Visitors and Maintenance Workers**	**Moderate**	Vertical and horizontal migration through the Made Ground soils.	The site lies within a Radon affected area where 10 – 30% of homes are at or above the Radon Action Level, full radon protective measures are required in the construction of the Zone 1 Visitors Centre Building.

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*Table 7 – **Zones 3 – 10:** Potential Contaminant Linkages*

PCL	Sources	Receptor	Risk	Potential Pathway	Remediation Recommended
1	Asbestos Containing Materials (chrysotile textile) identified within shallow Made Ground beneath hardstanding (tarmac) in 1 No. location (**Zone 7**) with a quantification of 1.158%	**Construction Workers.**	**Moderate/ Low**	Direct contact, inhalation of asbestos within soil or soil derived dust.	During the site investigation works in Zone 7, a sample returned a positive result for asbestos with a quantification of 1.158%. This was encountered beneath the tarmac hardstanding, in an area which is being developed to improve and build additional paths which would break the pathway between site end users, however construction workers could still be affected when lifting the old hardstanding. Appropriate PPE to be provided to construction and maintenance workers. Asbestos Management Plan with input from an asbestos specialist during construction works due to the presence of Asbestos Fibres within Made Ground soils.

It should be noted that further ground investigation is required in the areas that two bird hides will be relocated to.

Section 7.0 presents a strategy for handling unexpected contamination or contaminative incidents. It is further recommended that watching brief/periodic site visits are undertaken by a Geo-Environmental Engineer to record any unexpected contamination as outlined in Section 7.3.

It should be noted that risks and risk mitigation measures associated with historic mining are detailed in a separate report (Ref.5).

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5 CONTAMINATION REMEDIAL WORKS

With reference to the conceptual site model and the potential contaminant linkages detailed in *Tables 6 and 7,* remedial actions are recommended in order for the site to be brought up to a condition that is deemed 'suitable for use':

- **Remedial Action 1:** Excavation and off-site disposal of asbestos containing materials (where visibly encountered) to a suitable licenced waste management facility.
- **Remedial Action 2:** Suitable Asbestos Management Plan and measures during construction.
- **Remedial Action 3:** Engineered Capping Layer in areas of soft landscaping & Clean Service Corridors.
- **Remedial Action 4:** CS2 Gas Protection and Full Radon Protection Measures required in the construction of the Visitors Centre Building.

5.1 Remedial Action 1 – Removal of Visible Asbestos

PCL 1 and PCL 2 in *Table 6* and PCL 1 in *Table 7* identified at the site relates to the inhalation exposure to construction workers and site end users from asbestos in site soils identified within Zone 1 in 7 No. locations with asbestos fibre quantification ranging between <0.001 and 0.513%, and bulk asbestos cement sheet quantification of 15%; and in Zone 7 where asbestos chrysotile textile was identified within shallow Made Ground beneath hardstanding in 1 No. location with a quantification of 1.158%.

Asbestos is therefore widespread, particularly across Zone 1. Although it won't be possible to remove all asbestos fibres without removing all made ground soils, good practice prescribes that any fragments or asbestos containing materials where identified should be picked where possible and to be kept separated in line with those from any soil arisings. This is typically carried out by picking visible fragments at the point of excavation.

Such operations are carried out in accordance with an asbestos management plan as summarised in Section 5.2. This should be carried out by suitably qualified staff, wearing disposal overalls (type 5/6), gloves and fine dust (FPP3) masks in combination with adoption of dust suppression techniques and monitoring or other applicable methods as recommended by the Asbestos Management Specialist. The qualified staff are to be trained in the identification of asbestos at source. The qualification and competencies of all operatives undertaking monitoring and calibration documentation of equipment should be provided to the Engineer.

Bulk Asbestos identified within Zone 1 was confirmed to comprise of Chrysotile Cement Sheets pieces with an asbestos content of 15%$^{w}/_{w}$ and it is assumed that further asbestos contamination may be present in this area.

A engineered capping layer has been recommended in new soft landscaped areas as further discussed in Section 5.3 which will mitigate the risk from any residual ACM debris/fibres remaining in the site soils. As it's not practical to take this approach across all existing soft landscaped areas it is imperative that picking and clearance of any visible ACM at the surface extends across the Visitors Centre site.

5.2 Remedial Action 2 – Asbestos Management During Construction

Under current health and safety legislation, employers are required to carry out their own appropriate risk assessments and mitigation to protect themselves and their employees, other human receptors and the environment from potential contamination. Such risks must be adequately mitigated by law, specifically the Construction Design Management (CDM) Regulations, 2015 which require that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk.

It has been assumed that any future construction works on site will be undertaken in compliance with these requirements to address PCL 1 (*Table 6*) and PCL 1 (*Table 7*).

CL:AIRE have published guidance to aid in the classification of remediation works on Asbestos Containing Soils (ACS) compliant with Control of Asbestos Regulations 2012 (CAR). This is detailed in CL:AIRE (2016) "Control of Asbestos Regulations 2012 - Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials: Industry Guidance.

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Any works with asbestos containing soils are required to determine their classification in accordance with Control of Asbestos Regulations 2012. The specialist groundworks contractor is therefore to designate the works based on the investigation results but utilising their own additional testing and delineation if they deem it to be required. Subsequently the specialist groundworks contractor is to compile a method statement to establish an appropriate management, monitoring and supervisory procedure for the movement of soils as part of the required cut and fill (earthworks) operations. The specialist remediation contractor is to be responsible for management and record keeping as detailed in their method statement document.

Where, from the site investigations, materials are known to contain asbestos fibers good practice (JIWG CAR-Soil and CAR 2012) prescribes such material to be segregated to ensure materials would not cross-contaminate other soils and to reduce the risk of further fiber release to site workers.

Sections 2.1, 2.2, 3.1.1 and 3.1.2 should be consulted together with Curtins Phase 2 Ground Investigation(s), Exploratory Hole Location Plan Drawings and Exploratory Hole Logs for the locations, depths and type of asbestos identified during the Ground Investigations.

Materials containing asbestos >0.1% $^{w}/_{w}$ would be classed as hazardous waste.

Existing Made Ground containing asbestos should not be crushed or in any way treated due to risk of asbestos fibre release. It may be possible to use Made Ground soils as general fill subject to in situ trial tests and where managed appropriately by the Method Statement compiled by the Asbestos Management Specialist.

Any asbestos containing materials are identified at ground level should be picked where possible and disposed of in a suitable waste management facility.

5.3 Remedial Action 3 – Engineered Capping Layer & Clean Service Corridors

PCL 2 in *Table 6* identifies a risk to site end users and future maintenance workers from inhalation exposure due to the presence of asbestos containing materials within shallow Made Ground soils.

Zone 1 is anticipated to comprise a Visitor Centre Building along with associated carparking and soft landscaping, Zones 3 – 10 largely involve construction of new or improvement of existing paths and roadways which break the source to receptor linkage.

The potential for exposure to asbestos fibres is highest within soft landscaped areas and utility corridors where receptors (future maintenance staff and public) at the site are most likely to come in contact with the contaminated Made Ground soils. Drawings are included within *Appendix A.*

Hardstanding, including the building footprints, vehicular tarmac, pedestrian tarmac, and concrete and block paving are considered sufficient to break the potential contaminant linkage, PCL2 (*Table 6*) and therefore no specific remediation measures, above activities required for construction, are considered necessary if and where these are installed at the site.For all new soft landscaped areas within the Visitor Centre site, a clean cover layer is recommended. It is not practical to adopt this solution across existing soft landscaped areas which are to be retained on site due to size, cost and the numerous ecological constraints. Instead clearance of these areas for visible ACM is recommended as discussed in Section 5.1.

It is therefore recommended that verified clean capping, comprising a minimum total thickness of 450mm is incorporated in general soft landscaping areas. This is to be made up of a minimum 150mm imported topsoil and 300mm of sub-soil. Additionally, a high visibility warning geotextile break layer is to be installed beneath the clean cover system. Additionally, landscaped areas which will incorporate planted trees will require a more substantial clean cover layer, comprising a minimum thickness of 900mm. This is to be made up of a minimum 150mm imported topsoil and 750mm of sub-soil.

For service corridors/trenches it is recommended that clean imported fill is used as backfill. This will prevent future maintenance and utility workers digging through (asbestos) contaminated soils.

This is anticipated to provide adequate protection of human health with consideration of likely exposure and should be incorporated in all proposed soft landscaped areas and utility corridors.

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5.4 Remedial Action 4 – CS2 Gas Protection & Full Radon Protection Measures

PCL 3 relates to the elevated Carbon Dioxide (>5%) identified within Made Ground soils within Zone 1, which has been assessed as CS-2 requiring ground gas protection measures. PCL 4 relates to the Radon Affected Area within Zone 1, where 10-30% of homes are at or above the Action Level, a BGS Radon Report was obtained which states any future development will require Full Radon Protection Measures.

It is recommended that the building type is classified as *Type C Commercial* building, in accordance with BS;8485:2015 +A1:2019 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.

On this basis, for a **Characteristic Situation 2 (CS2) gas regime** a minimum protection score of 2.5 points should be achieved in non-ventilated areas as a minimum, in accordance with BS 8485. A minimum of two types of protection are required from i) a structural barrier, ii) ventilation measures, iii) gas membrane. A sub-floor void would provide 1.5 points and gas membrane 2 points.

The site also lies within a Radon Affected Area where 10-30% of homes are at or above the Radon Action Level, where **Full Radon Protective Measures** are required in the construction of the Zone 1 Visitor Centre Building. Details of protective measures can be found in BR 211. The guidance on protective measures for new buildings provides guidance for reducing the concentration of radon in new buildings and so reducing the risk of occupants being exposed to it.

In areas where there are higher levels of radon, minor imperfections in the radon membrane may let through enough radon to cause the action level to be exceeded. In these higher radon areas, the quantity of radon reaching the barrier can be reduced through the provision of protection (either a radon sump or a ventilated subfloor void) that can be activated if needed by the addition of a fan.

Full radon protection therefore comprises a radon barrier across the ground floor supplemented by provision of subfloor depressurization or ventilation (either a radon sump or ventilated subfloor void).

Full Radon Protection Measures installed must also be suitable to address PCL 3 and CS-2 in regard to ground gas protection measures and as such a suitable membrane must be utilised. The gas resistant membranes should be:

a. sufficiently impervious to radon, methane and carbon dioxide;
b. capable after installation of providing a complete barrier to the entry of the relevant gas.
c. sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions;
d. sufficiently strong to withstand in service stresses (e.g. due to ground settlement if placed below a floor slab);
e. sufficiently strong to withstand the installation process and following construction activities until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, and dropping tools); and
f. chemically resistant to degradation by other contaminants that might be present.
g. Verified in accordance with C735 and BR 211.

The above information is for guidance only. It is recommended that the gas protection system is designed, installed and verified/inspected by a specialist.

5.4.1 Gas Protective Measures Quality Management Record

To be successful, Gas Protective Measures need to be implemented consistently through the construction process from design stage through to handover. It is recommended that the Radon Protective Measures Quality Management Record outlined below should be followed. This is also applicable for other permanent gases such as carbon dioxide and methane gas affecting the site.

As outlined it is recommended that the gas protection system is designed, installed and verified/inspected by a specialist. Associated records should be provided to Curtins for inclusion in the Phase 4 Verification Report.

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A risk-based approach is recommended, via Pre-Inspection Planning, which would consider various elements that could affect the performance of the radon protection system; this in turn would dictate the number of visits and degree of testing. This would include:

- Experience and qualifications of workforce.
- Complexity of construction.
- Complexity of radon protection design.
- Degree of radon design including whether basic or full.
- Protection board and the impact of secondary trades.

The acceptable inspection and testing methods for a radon protection system application (laps, seams, body of membrane, penetrations, connections to DPCs) includes the established testing methods of:

- Visual
- Pick and probe
- Air lancing
- Inert gas testing
- Smoke testing
- Dielectric testing.

The type of test would be project specific and recorded in the Inspection Plan, testing is dependent on the degree of risk associated with the construction. It is recommended that the inspector is appointed at the earliest possible stage prior to system installation. This will assist the scheduling during the installation phase.

Table 8 – Radon Protective Measures Quality Management Record

Design		**Allocate Contractual Responsibility**
Radon Search	Conduct a search to establish what level of protection is required, in this case, Full Radon Protection measures are required.	Client / Designer
Drawings	With full radon protection, identify the location of sumps and their exhaust outlets or underfloor vents (ensuring adequate numbers on at least two faces of the building to ensure a cross flow of air). Liaise with building control.	Designer
Specification	Specify appropriate materials, check with manufacturers and suppliers that components, materials and sealants are compatible with each other and are suitable for use as a radon barrier. Consider using accredited installers particularly for more complex projects, determine the inspection regime and on-site quality management.	Designer
Buildability	Consider buildability and the order of construction/inspection necessary to achieve a continuous barrier.	Construction / Design Team
Construction		**Allocate Contractual Responsibility**
Schedule of work and Pre-Inspection Planning	A risk-based approach is recommended, via Pre-Inspection Planning, which would consider various elements that could affect the installation and performance of the radon protection system including the complexity of the installation, the competency of the application team and influences of adjacent and follow-on trades.	Construction Design Team / Inspector
Procurement of materials and installers	Ensure that materials purchased match the requirements set in the project specification. Reduced specification is likely to result in reduced protection. Consider using accredited installers particularly for more complex projects.	Contractor / Inspector
Weather conditions	Avoid installation of barriers in wet, windy or cold weather. Minimise the length of time that the barrier is exposed to the weather. It is easier to lay a barrier internally just before laying a protective layer such as a floor topping. Weather conditions to be recorded.	Contractor / Inspector
Barriers through walls	Ensure cavity trays are installed with an adequate step to prevent damp penetration, all joints in the tray and where it abuts the main floor barrier are, sealed, and, weepholes and cavities are clean. An installation inspection record is required.	Designer / Inspector
Barriers within floors	Check that the membrane is laid on a smooth level surface (typically blinding or insulation), all joints in the membrane and where it abuts barriers through walls are sealed, and all penetrations for services or structural members are fully sealed. An installation inspection record is required.	Inspector

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Sumps	Ensure that sumps are correctly located and assembled, that exhaust pipework is not damaged and exits the building away from doors, windows and vents, and is suitably labelled. An installation inspection record is required.	Inspector
Underfloor ventilation	Check that sufficient underfloor vents have been installed as required, and that they are clear. An installation inspection record is required.	Inspector
Prior to covering up	Protect the completed barrier and inspect for damage, repairing as necessary immediately prior to covering up with later construction. An installation inspection record is required.	Inspector
Completion		**Allocate Contractual Responsibility**
Prior to Handover	Check that the exhaust outlet from the sump is labelled and the outlet and/ or underfloor vents have not been covered up by landscaping works. An installation inspector record is required.	Installer / Inspector
Handover	Provide a report explaining the level of Radon protection provided, see 'information to be provided to the purchaser' section. This report should include a completed Radon Protective Measures Quality Management Record and documented evidence of the installation inspection.	Builder
Radon Monitoring	It is recommended by the UK Health Security Agency (HSA) that any new building should be subject to an appropriate test during the first year of occupation. The proposed dates for radon testing to commence should be included in the handover document.	Occupier

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6 SPECIFICATION FOR SITE WON AND IMPORTED SOILS

This section outlines the required chemical testing specification that the imported or re-used site soils used in soft landscaping areas and service corridors must meet to satisfy Remedial Action 3 along with a chemical testing specification.

6.1 Sourcing of Materials

6.1.1 Off-Site Sources

It is anticipated that materials may be imported to the site. It is strongly recommended that materials are sourced from reputable suppliers and comprise materials that have been suitably processed to produce standardised materials.

It is not recommended that materials are imported directly from 'donor' development sites. Imported material will also require verification testing to ensure suitability for reuse, and it is strongly advised that the Contractor undertake their own independent verification testing if accepting material from a third party, rather than relying on supplier reports.

It is anticipated that crushed hardcore stone and brick may be imported for use in earthworks such as in construction of piling mat or haul roads. For testing requirements on such materials reference should be given to Curtins Earthworks Specification.

6.1.2 On-site Sources

Based on the findings of the Ground Investigation, it is considered highly unlikely that the shallow Made Ground within Zone 1 could be considered 'uncontaminated', 'clean' or 'suitable' material for re-use as a subsoil or topsoil in new soft landscaped areas due to the presence of asbestos fibres within soils identified within TP 1-03, TP 1-04, DSBH 1-01, DSBH 1-03 and CP 1-01, along with bulk ACM observed within Made Ground in CP 1-01 and CP 1-01B.

6.2 Imported Topsoil

Imported Topsoil will invariably be required and should be supplied and placed in accordance with the Architects' specification but generally it is anticipated that all topsoil will be a minimum of 150mm thick in proposed soft landscaped areas. Where topsoil is imported, it is to be 'Multipurpose' in accordance with BS 3882:2015 'Specification for Topsoil and Requirements for Use'.

The topsoil should also be confirmed to be 'suitable for use' as per the analysis outlined in *Section 6.5.*

6.3 Imported Subsoil

Where imported subsoil is required as part of the growing medium this can be cohesive or granular but should be free-draining and confirmed to be 'suitable for use' as per the analysis outlined in *Section 6.5* and compliant with BS 8601:2013 'Specification for subsoil and requirements for use'.

6.4 Imported Soils for Backfill of Utility Trenches

This must be confirmed as 'suitable for use' as per the analysis outlined in *Section 6.5.*

The utility provider and or designer's requirements/specification should be requested to ensure suitable materials are used for backfill.

6.5 Chemical Composition of Soils

All materials used in capping should not contain concentrations of contaminants that present an unacceptable risk to the health of future site occupants or off-site receptors.

The Contractor shall be responsible for demonstrating that imported material is 'clean' and therefore suitable for use as part of the engineered capping or else as fill material. This will include the recovery of samples for laboratory testing from both the material source and verification testing of material following delivery to site. The required testing

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frequencies for materials source types are detailed below. Other sources may be applicable, however testing frequencies shall be confirmed with the Engineer prior to acceptance.

Table 9 - Environmental Chemistry Testing Frequency for Soils

Impacted Soils	Testing Frequency
Imported Soils (Greenfield/ Manufactured)	On Site Verification: One sample every 200m^3 used (or a minimum of 3 No. samples, whichever is greater), testing to be undertaken once material is imported to site.
Imported Soils (Remediated/ Brownfield/ Unknown)	On Site Verification: One sample every 50m^3 used (or a minimum of 3 No. samples, whichever is greater), testing to be undertaken once material is imported to site.
Site Won Soils	On Site Verification: One sample every 50m^3 used (or a minimum of 3 No. samples, whichever is greater), testing to be undertaken once material has been placed/stockpiled for use.

The environmental chemistry testing requirements and frequency are as *Tables 9 and 10*. Additions to the suite and frequency of sampling may be required based on the source of imported materials. For example, if the imported Topsoil is not naturally sourced, e.g., recycled soil, further chemical determinants may be added to the chemical analysis suite at the discretion of the Engineer.

Table 10 - Environmental Chemistry Analysis Suite for Soils

Suite Reference	Environmental Chemistry Analysis
Greenfield, Brownfield or Manufactured Soils	Total metals: Arsenic, cadmium, chromium, chromium VI, lead, mercury, selenium, copper, nickel, zinc, water soluble boron; pH Soil Organic Matter Asbestos Screening Polycyclic Aromatic Hydrocarbons by GC-MS (Detection Limit 0.1mg/kg for each compound) Total Petrol Hydrocarbons (Full TPHCWG analysis – aromatic/aliphatic split, Detection Limit 0.01mg/kg for each banding C5 to C10 and 1mg/kg for bandings above C10)

Assessment criteria: Concentrations of the above determinants shall not exceed the '*Commercial*' screening criteria (contained within Appendix B).

Definition of 'clean': Where ALL concentrations are less than these values the soils shall be defined as 'clean'. No asbestos shall be detected in soils described as 'clean'.

Soil organic matter (SOM): A review of the thresholds may be made for specific soil sources whereby the Soil Organic Matter ranges.

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7 STRATEGY FOR HANDLING POTENTIALLY CONTAMINATED SOILS AND CONTAMINATIVE INCIDENTS ON SITE

7.1 Contaminated Soils

Surplus soils to be removed from site, which have been identified as unsuitable for re-use should be loaded onto a lorry, covered securely, and transported directly to the landfill facility.

Where stockpiling is unavoidable, the stockpile should be located on an impermeable membrane and be covered also with a low permeability membrane at the end of each working day. Where soils are wet when excavated, measures should be taken to ensure there is no runoff from the soils onto the surrounding soils.

Duty of Care: Under his duty of care, the Principal Contractor shall ensure the proper and safe disposal of waste from each site after it has been passed on to another party. In this respect details of the landfill facility to be used and the company disposing of the waste with regard to hazardous and non-hazardous waste shall be provided to the Site Manager. Copies of Consignment Notices for special waste and Waste Transfer Notes for hazardous and non-hazardous waste shall be kept on site for review by Curtins Consulting.

7.2 Contaminative Incidents

It is possible, however unlikely, that some below ground features / structures exist that have not been recorded on plans and have not been encountered during the ground investigation works. It is possible that unknown/unrecorded substructures (e.g. fuel tanks) may exist which if ruptured may release materials that could contaminate the surrounding soils and groundwater (petroleum hydrocarbons, solvents, for example). In the unlikely event that this occurs an outline strategy is detailed below.

Where such a tank/pipework is damaged during excavation and the contents are released into the surrounding soil, the tank/pipework should be immediately pumped dry into another suitable container and a trench with a low permeability base formed around the tank/pipework to prevent seepage laterally and to collect the contaminant. Where groundwater is encountered in the trench, it should be pumped into a suitable container and tested for the contaminant. All soils affected shall then be tested and removed from site as appropriate.

Where the damage is caused to the underside of a tank and seepage is vertical, the contaminants may present a risk of polluting the groundwater. In this instance and subject to the findings of a risk assessment boreholes may be required to prove and intercept the contaminant. The contaminant will then be pumped into suitable containers.

The procedure outlined in *Section 9.3* should also be adhered too and the Engineer shall approve all proposals for such remediation.

7.3 Unexpected Contamination & Watching Brief

In the event that material is revealed on the site of a nature that does not accord with the previously observed and recorded descriptions, including the potential presence of previously uncharacterised asbestos contamination, the following procedure is to be complied with.

1. Cease and make safe all excavations in this location and report observations to the Site Manager.
2. The Site Manager is to notify the Engineer.
3. Under guidance of the qualified Engineer take representative samples of the suspect materials and forward to a suitably accredited laboratory for analysis.
4. Carlisle City Council's Contaminated Land Planning Officer and if relevant the Environment Agency are to be kept fully informed of any such occurrences. Contaminated Land Planning Officer must agree the strategy for dealing with unexpected contamination before works continue in that area.
5. Await Engineers instructions with respect to re-commencement of the works and or removal from of suspect material to a suitably licensed disposal facility (following guidance outlined in Section 9.1 above).

It is recommended that in addition to the above a **'watching brief' for unexpected contamination** is undertaken. It is recommended that this includes periodic site visits undertaken by the engineer during the groundworks phase such

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during site preparation, removal of contaminated soils and or groundwater from site as well as visiting site as soon as potential contamination is observed by the contractor.

Records of any unexpected contamination must be included within the Remediation Completion Report.

7.4 Health & Safety

This section details health and safety requirements associated with contaminated land but does not seek to cover all aspects to be managed by the Contractor under CDM Regulations and detailed in Method Statements.

The works are likely to generate soil, dust, waste asbestos containing materials, groundwater, and other materials that may be a risk such as petroleum hydrocarbons and other related chemicals. The Contractor shall incorporate in its health and safety plan provisions for protecting personnel from physical and chemical hazards associated with these materials. The health and safety plan should also incorporate personnel decontamination requirements and facilities.

7.4.1 Contractor Method Statements

The Contractor is required to prepare method statements relating to the separate tasks highlighted and provide these to the client or Principal Designer along with the Engineer for review prior to the commencement of the related works.

The Contractor shall induct all its employees and subcontractors into the relevant aspects of their health and safety plan and method statements prior to each employee and/or subcontractor commencing work on site.

No work shall commence until the clients' nominated Principal Designer has approved the task specific method statement.

7.5 Environmental Controls

Environmental Controls are the responsibility of the Contractor. However, in general this section details specific requirements for potentially contaminated soil and is not intended to cover all aspects to be managed by the Contractor and detailed within their Method Statements.

Without limiting the Contractor's obligations, it shall be their responsibility to comply with all applicable laws, regulations and rules relating to potential contamination regarding:

- Surface water run-off.
- Airborne particulates/vapours/odour; including asbestos materials and fibres, and,
- Control of spillages.

Method statements are to be provided to the Engineer and should incorporate the environmental management measures pertaining to the above factors, with further detail given below.

7.5.1 Surface Water Run-Off

The Contractor is responsible for ensuring that site surface water run-off does not leave the site.

The Contractor is to provide for necessary surface water diversion systems as required to keep the construction area free from excess surface or groundwater that may interfere with the works.

All personnel engaged by the Contractor should be trained in response techniques (e.g., use of absorbent materials, etc.) to ensure that any surface water run-off with fuel leakage impact or associated potentially contaminated soil is managed appropriately.

7.5.2 Airborne Particles/Vapour/Odour

The Contractor is responsible for the implementation of dust suppression in work areas, using water or other means of suppression that are not considered harmful to the environment. The Contractor should also set out procedures for the mitigation of any potential odours that may arise from exposed contaminated soils that could affect off-site users (adjacent residents).

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An Asbestos Management Plan must be in place during earthworks and construction works, to inform procedures and mitigation measures to be implemented during excavation and removal of asbestos containing materials.

7.5.3 Control of Spillage

During the phase of works, any type of spillage (including fabricating, hydraulic oils, fuels and/or other materials) should be immediately contained, removed, and disposed of, with any further surrounding areas cleaned.

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8 VERIFICATION & REPORTING

It is recommended that this Remediation Strategy is updated following characterisation of site soils in the two areas (Zone 5 and Zone 7) where bird hides have been relocated.

During verification visits shall be undertaken by an appropriately qualified environmental engineer throughout the construction phase to ensure that the requirements of the Remediation Strategy have been implemented at the site. This includes periodic visits/watching brief during groundworks. It is anticipated records of the following will be taken during the below phases of work:

- Removal of visible asbestos containing materials where encountered within shallow Made Ground and ground surface in Zone 1.
- Documentation of general works including records from watching brief, asbestos management procedures during the works and records of contaminative incidents and any unexpected contamination.
- Documentation of Ground Gas and Full Radon Protection Measures being installed beneath the Visitor Centre Building in Zone 1 along with the Quality Management Record. Installation, inspection and verification should be carried out by a specialist with records provided to Curtins.
- During import of soils for use in new soft landscaped areas and as clean backfill in service trenches with chemical testing carried out as specified.
- During/following placement of engineered capping and backfill of service trenches. Verification of capping construction will be required.

All associated documentation pertaining to the above will be supplied to the Engineer and incorporated within a Completion Report.

The frequency and timing of visits by Curtins shall be determined following confirmation of the construction phase programme and the chosen protection elements.

Confirmatory analysis is required to confirm the suitability of any imported material, the results of which will be included within the Completion Report. Any additional, confirmatory testing will also be included herein.

Verification through either hand excavated trial pits or comparison of reduced and final level surveys will all be included within the Completion Report to confirm the provision of soft landscaping.

The Completion Report should include the records and information described above as well as the following:

- Confirmation that the remediation has been undertaken satisfactorily and in accordance with the Remediation Statement;
- Confirmation that the remediation objectives have been achieved (see *Sections 6.0 and 7.0*);
- Details of any unexpected contamination encountered on site and appropriate measures taken to respond;
- A revised conceptual model showing no potentially significant contaminant linkages remain at the site;

It should be noted that the above list does not include the requirements of a Mining Risk Verification Report, Earthworks Completion report and Materials Management Completion report (where soils are re-used under an MMP) which are also likely to be required in addition to the above remediation completion report.

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APPENDICES

Appendix A – Drawings & Specifications

Appendix B – Screening Criteria for Imported Materials

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Appendix A - Drawings & Specifications

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NOTES:

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KEY

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Location: To primary pedestrian routes
Dims: 1.5m wide

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Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

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Client
Cumberland Council

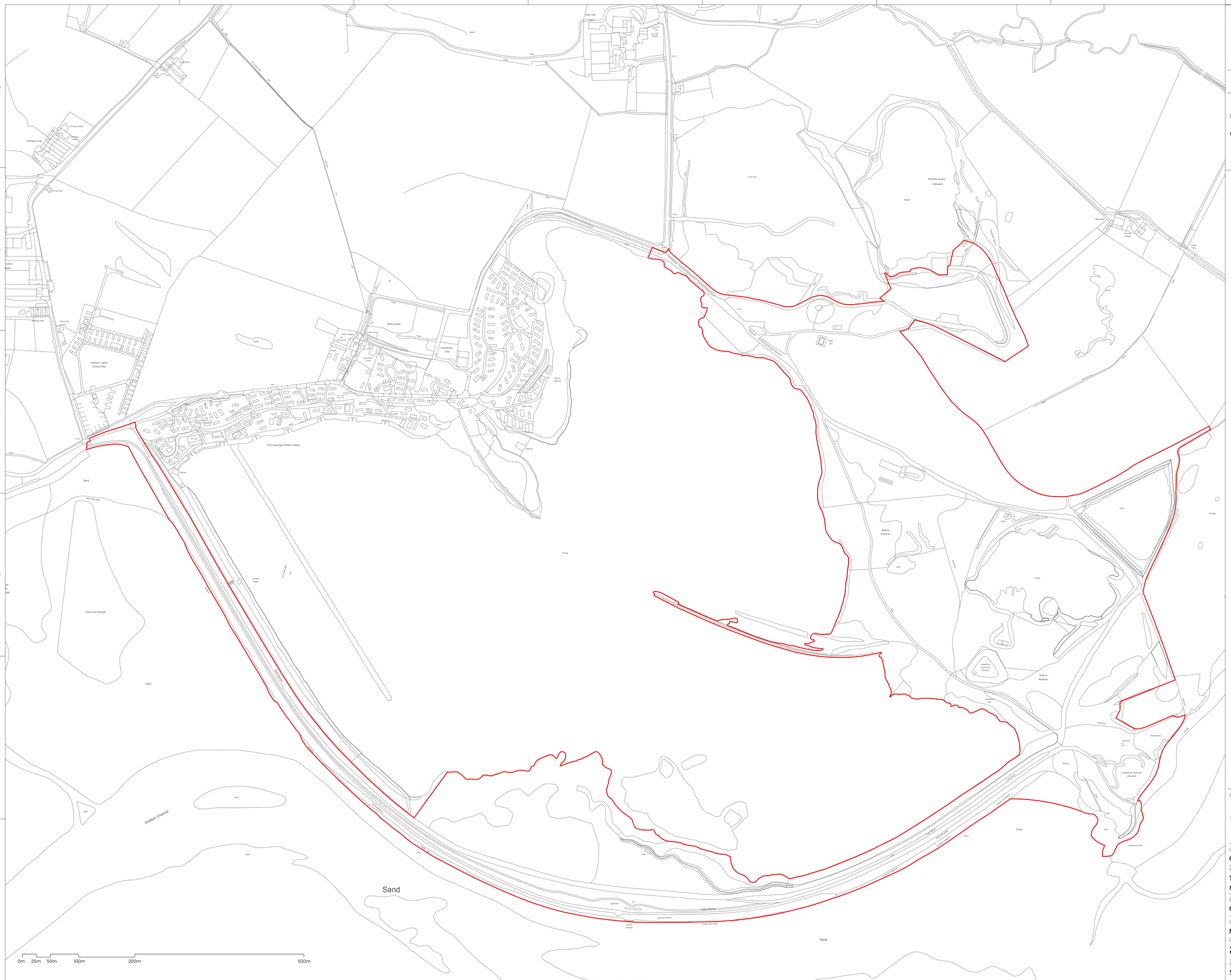
Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Site Masterplan

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289	LYR	XX	ZZ	DWG	L	1000

Work Stage	Status	Revision
Stage 3	Planning	P02


New Hall
Pond
Track
Wood End
Whitrigga Close
Whitrigga Cottage
Telegraph Hill
Mast
Steel Green
Harbour Lights
(Camp Site)
Pond
Hardwicks
(Pits)
Port Haverigg Holiday Village
Nature
Reserve
Sand
Mean High Water
Sand and Shingle
Leading
Stage
Outer Barrier
Lighthouse
Spring Masonry
Stones
(Above)
Mean High Water
Redhills Quarry
(closed)
Heap (disc)
Shaft
(dis)
Hodbarrow
Lighthouse
(disused)
Hodbarrow
Mine
Hodbarrow Quarries
(Disused)
Hodbarrow Point
Ponds
Shingle
Rock
Path (uncl)
Drowsty Hole
Drowsty Hole Level
Hodbarrow Level
Hodbarrow Mine
Adit
Shaft
Ore Bin
Path
Track
Ditch
Fence
Wall
Building
Slope
Pylon
Sluice
Weir
Ford
Quay
Jetty
Groyne
Hide
Viewpoint
Sewage Works
Caravan
Site
Steel Green
Cottages
Steel Green
House
Nature Reserve
Harbour View
Moor Road
Whitrigga Cottage
Whitrigga Close
Wood End
New Hall
New Hall Cottage
Redhills Quarry
(closed)
Red Hills
Hall Gate
Cottages
Shaw Park
Path (uncl)
Drowsty Hole
Hodbarrow Quarries
(Disused)
Hodbarrow Point
Ponds
Sand
Sand
Sand



NOTES:

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ORIGINATOR

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Project
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289	LYR	XX	ZZ	DWG	L	1002

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

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289	LYR	XX	ZZ	DWG	L	1200

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Stage 3	Planning	P02



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Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Hodbarrow Car Park

Created By	Checked By	Scale	Sheet Size
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Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1201

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Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

NOTES:

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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whitehouse Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

ORIGINATOR

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39 High Bridge Works
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Cumberland Council

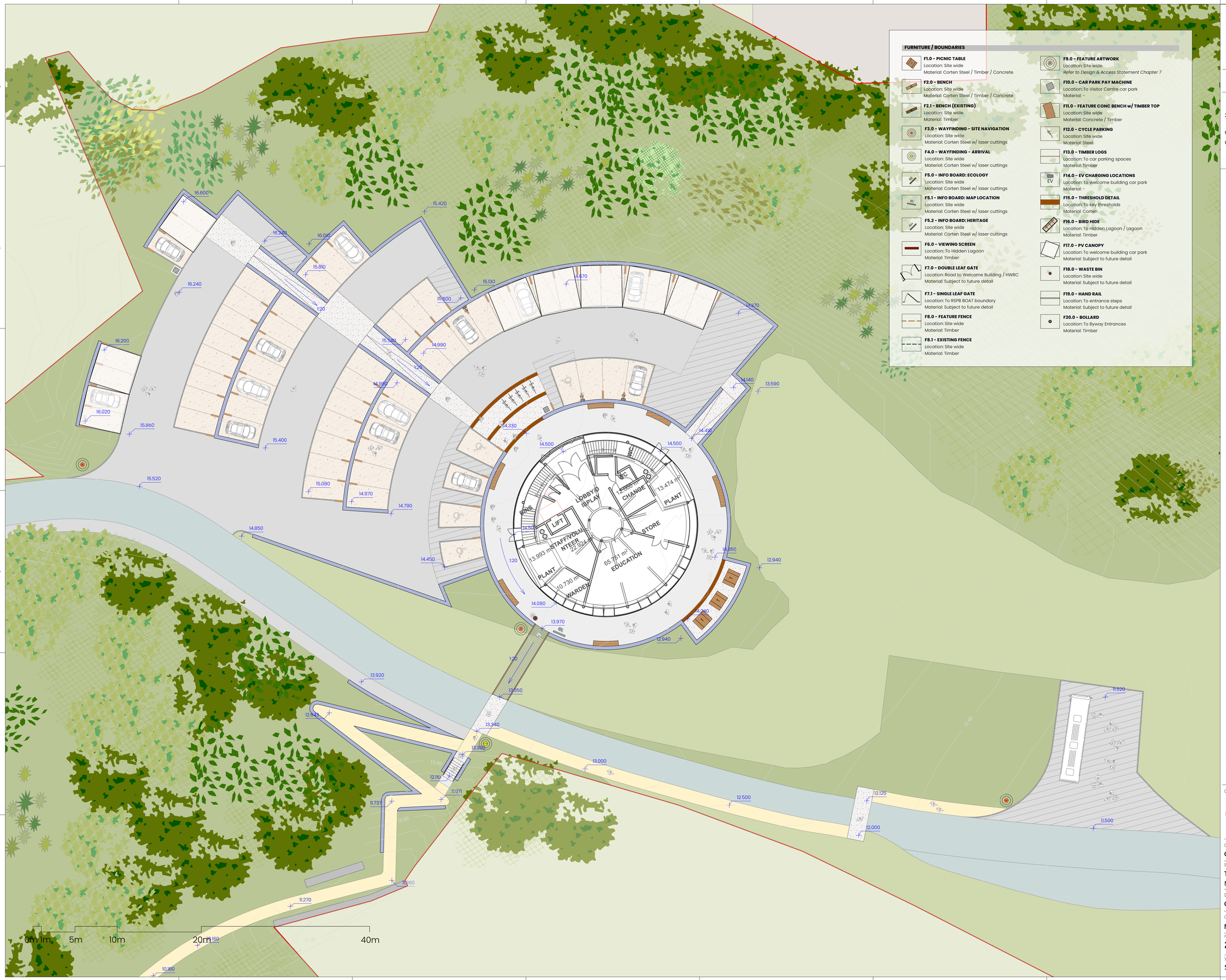
Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Visitor Centre 1:500

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:500	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1202

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site Wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

NOTES:

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07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
03/04/25	P02		Updates	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whitehorse Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

ORIGINATOR
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SK9 1DR
NEWCASTLE
Studio 29
39 High Bridge Works
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NE1 1EW

Client
Cumberland Council

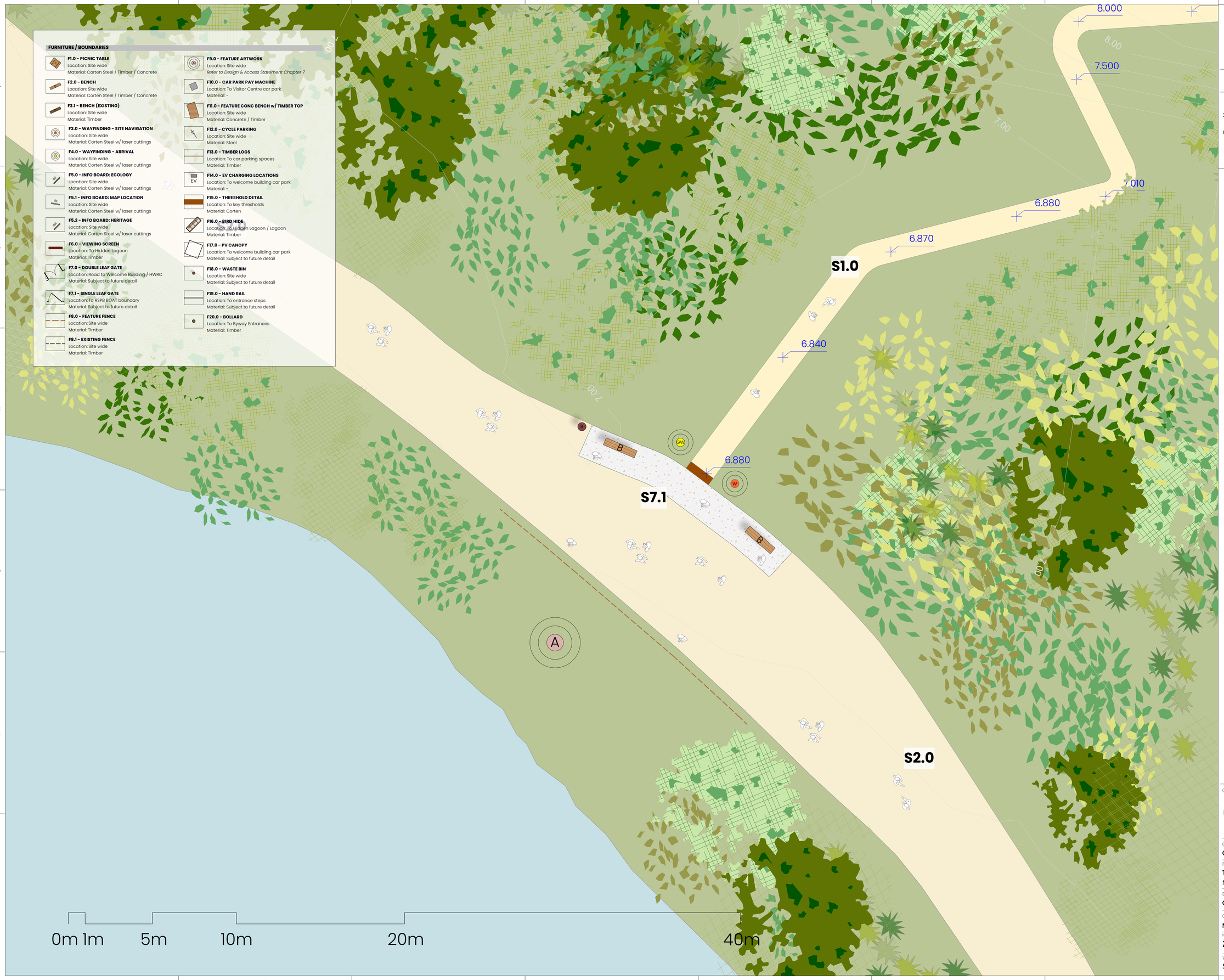
Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Visitor Centre 1:200

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:200	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1203

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING - SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING - ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 - SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 - EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

NOTES:
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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

ORIGINATOR
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SK9 1DR
NEWCASTLE
Studio 29
39 High Bridge Works
Newcastle-upon-Tyne
NE1 1EW

Client
Cumberland Council

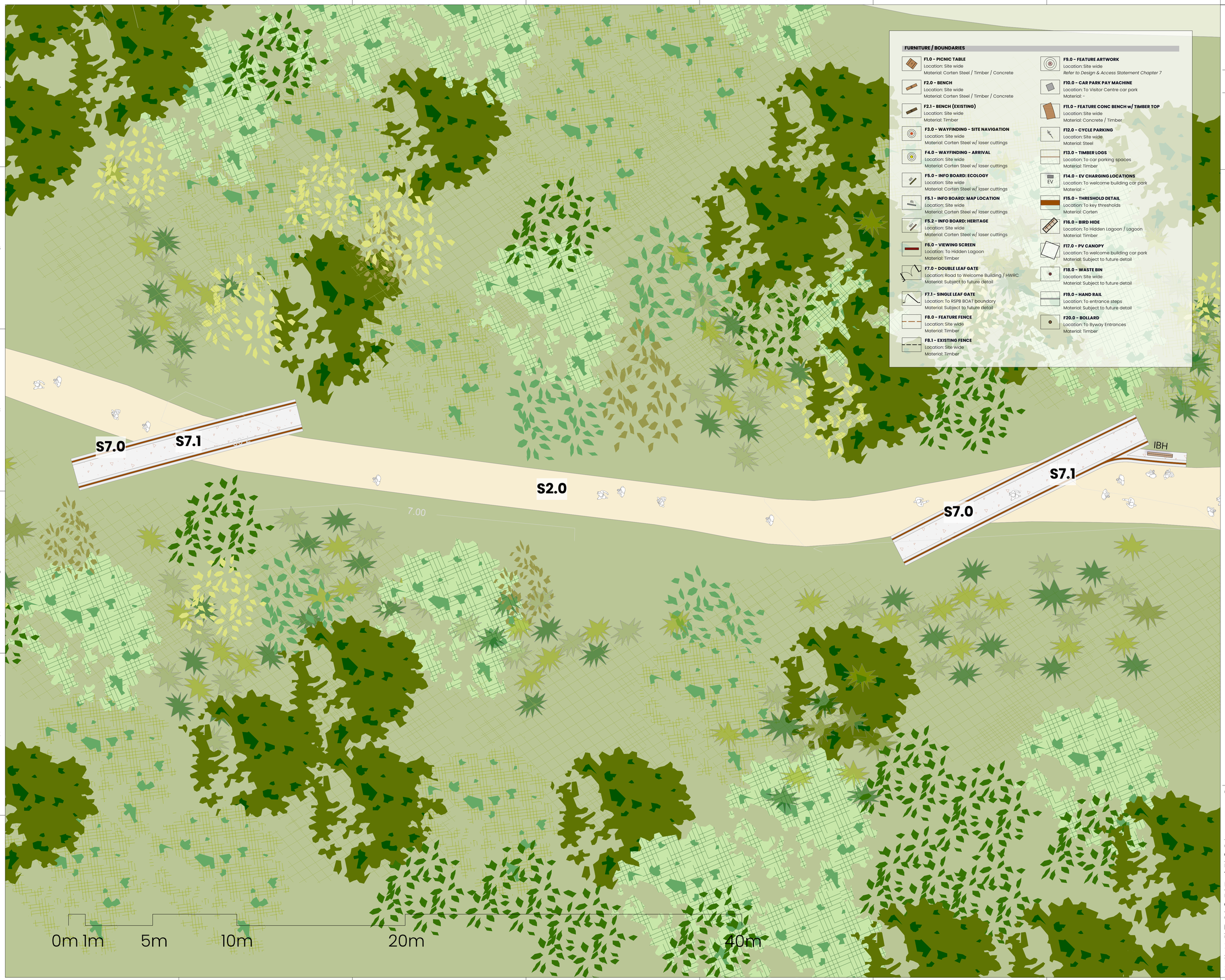
Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Iron Line Entrance

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:100	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1204

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
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F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

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Material: Timber

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07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

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S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

ORIGINATOR
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Cheshire
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NEWCASTLE
Studio 29
39 High Bridge Works
Newcastle-upon-Tyne
NE1 1EW

Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Iron Line Railway Pass

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:100	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX-ZZ-DWG-L-1205				

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
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F5.2 – INFO BOARD: HERITAGE
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Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
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Material: Timber

F7.0 – DOUBLE LEAF GATE
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Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
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Location: To welcome building car park
Material: -

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F17.0 – PV CANOPY
Location: To welcome building car park
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F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

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REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

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Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Coal Pit Hide

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:100	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1206

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 - CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 - CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 - EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 - THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 - BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 - PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 - WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 - HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

NOTES:

1. DO NOT SCALE FROM THIS DRAWING. ALWAYS WORK TO NOTED DIMENSIONS.
2. ALL SETTING OUT, LEVELS AND DIMENSIONS TO BE CHECKED ON SITE PRIOR TO THE INSTALLATION OF MATERIALS AND ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR IMMEDIATELY.
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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

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Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Whiterock Junction

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:200	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1207

Work Stage	Status	Revision
Stage 3	Planning	P02

FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
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Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

NOTES:
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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

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Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
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Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
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S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
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S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
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Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

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Client
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Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Towsey Hole Windmill

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:200	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1208

Work Stage	Status	Revision
Stage 3	Planning	P02



NOTES:

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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 - SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

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Location: To Byway
Dims: As existing

S3.0 **S3.0 - TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 - VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 - VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
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Dims: 4.8m wide

S6.0 **S6.0 - NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 - INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 - INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 - REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 - RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE - SURFACE EXISTING**
Location: As noted

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Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Hodbarrow Beacon

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:100	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1209

Work Stage	Status	Revision
Planning	Information	P02

FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

S1.0
10.000
10.500
11.000
S8.0
IBE
S1.0
0m 1m 5m 10m 20m 40m

NOTES:
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REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

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Location: To primary pedestrian routes
Dims: 1.5m wide

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Dims: As existing

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S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

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NEWCASTLE Studio 29 39 High Bridge Works Newcastle-upon-Tyne NE1 1EW

Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Annie Lowther Hide

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:100	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1210

Work Stage	Status	Revision
Stage 3	Planning	P02

FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
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F2.1 – BENCH (EXISTING)
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F3.0 – WAYFINDING – SITE NAVIGATION
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F5.2 – INFO BOARD: HERITAGE
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F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
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0m 1m 5m 10m 20m 40m

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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

ORIGINATOR

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NE1 1EW

Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Sea Wall (Typical Arrangement)

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:200	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1211

Work Stage	Status	Revision
Stage 3	Planning	P02



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

NOTES:

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07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 – NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 – INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 – INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

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Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Haverigg Lighthouse

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:100	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1212

Work Stage	Status	Revision
Stage 3	Planning	P02

FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING – SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING – ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

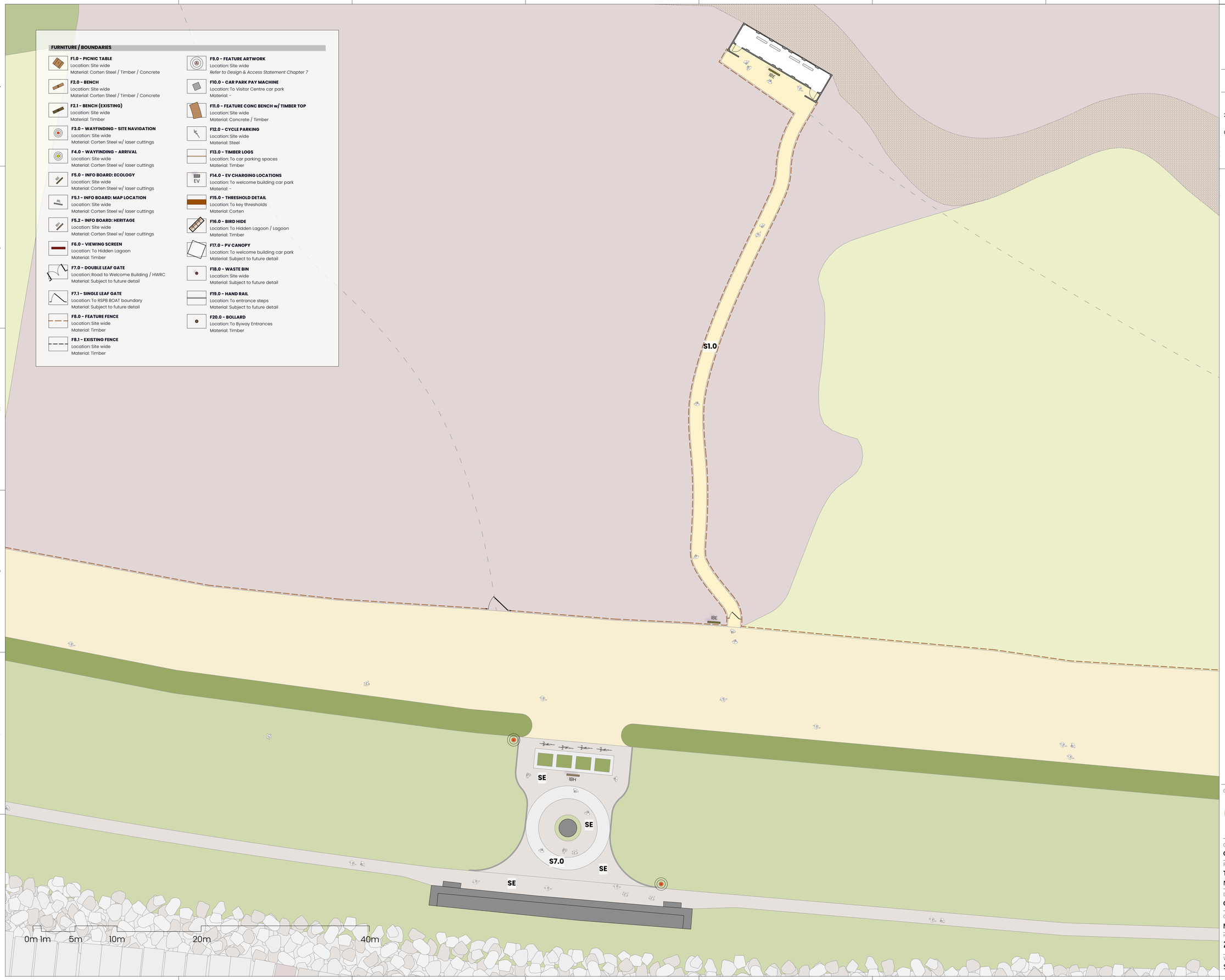
F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
Material: Timber

F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber



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07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
26/03/25	P01		Stage 03 draft issue - for coordination	MDM
07/04/25	P02		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 – SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 – STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 – TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 – VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 – VEHICULAR ROUTE (MACADAM) (V)**
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Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 – REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 – RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE – SURFACE EXISTING**
Location: As noted

ORIGINATOR
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Client
Cumberland Council

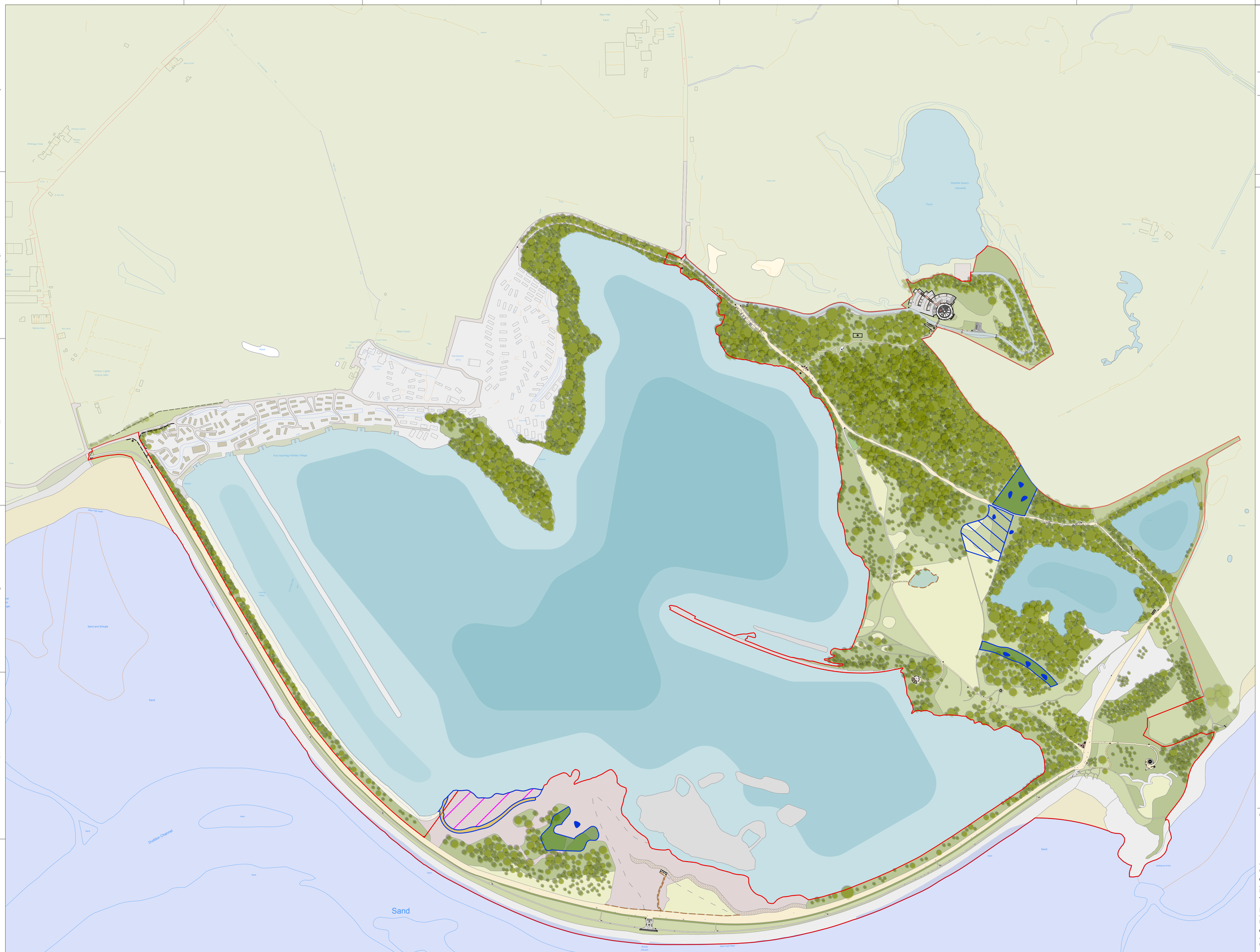
Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Haverigg Lighthouse & Tern Island Hide

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:200	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1213

Work Stage	Status	Revision
Stage 3	Planning	P02



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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
03/06/24	P01		Preliminary Issue	MDM
04/04/25	P02		Revised Issue	CE
07/04/25	P03		Issued for planning	MDM

KEY

GENERAL INFORMATION

- APPLICATION BOUNDARY

RSPB SRP WORKS

- UNDISTURBED SLAG HABITAT CREATED
- CHANNEL CUT IN SLAG
- POOL CREATION
- BRACKEN CLEARANCE
- BRACKEN CLEARANCE

ORIGINATOR

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NE1 1EW

Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | RSPB SRP Works

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:3000	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1300

Work Stage	Status	Revision
Stage 3	Planning	P03



FURNITURE / BOUNDARIES

F1.0 – PICNIC TABLE
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.0 – BENCH
Location: Site wide
Material: Corten Steel / Timber / Concrete

F2.1 – BENCH (EXISTING)
Location: Site wide
Material: Timber

F3.0 – WAYFINDING - SITE NAVIGATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F4.0 – WAYFINDING - ARRIVAL
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.0 – INFO BOARD: ECOLOGY
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.1 – INFO BOARD: MAP LOCATION
Location: Site wide
Material: Corten Steel w/ laser cuttings

F5.2 – INFO BOARD: HERITAGE
Location: Site wide
Material: Corten Steel w/ laser cuttings

F6.0 – VIEWING SCREEN
Location: To Hidden Lagoon
Material: Timber

F7.0 – DOUBLE LEAF GATE
Location: Road to Welcome Building / HWRC
Material: Subject to future detail

F7.1 – SINGLE LEAF GATE
Location: To RSPB BOAT boundary
Material: Subject to future detail

F8.0 – FEATURE FENCE
Location: Site wide
Material: Timber

F8.1 – EXISTING FENCE
Location: Site wide
Material: Timber

F9.0 – FEATURE ARTWORK
Location: Site wide
Refer to Design & Access Statement Chapter 7

F10.0 – CAR PARK PAY MACHINE
Location: To Visitor Centre car park
Material: -

F11.0 – FEATURE CONC BENCH w/ TIMBER TOP
Location: Site wide
Material: Concrete / Timber

F12.0 – CYCLE PARKING
Location: Site wide
Material: Steel

F13.0 – TIMBER LOGS
Location: To car parking spaces
Material: Timber

F14.0 – EV CHARGING LOCATIONS
Location: To welcome building car park
Material: -

F15.0 – THRESHOLD DETAIL
Location: To key thresholds
Material: Corten

F16.0 – BIRD HIDE
Location: To Hidden Lagoon / Lagoon
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F17.0 – PV CANOPY
Location: To welcome building car park
Material: Subject to future detail

F18.0 – WASTE BIN
Location: Site wide
Material: Subject to future detail

F19.0 – HAND RAIL
Location: To entrance steps
Material: Subject to future detail

F20.0 – BOLLARD
Location: To Byway Entrances
Material: Timber

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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

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03/06/24	P01		Preliminary Issue	MDM
04/04/25	P02		Revised Issue	CE
07/04/25	P03		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 - SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 - STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 - TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 - VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 - VEHICULAR ROUTE (MACADAM) (V)**
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Location: To Towsey Hole Windmill

S7.0 **S7.0 - INSITU CONCRETE w/ SMOOTH FINISH (P)**
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S7.1 **S7.1 - INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
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S8.0 **S8.0 - REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 - RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE - SURFACE EXISTING**
Location: As noted

PRIORITY HABITAT TYPES

ANNEX 1 H6210 CALCAREOUS GRASSLAND
Type: Briza-Brachypodium
Status: Maintained

ANNEX 1 H6210 CALCAREOUS GRASSLAND
Type: CG1
Status: Maintained

PRIORITY HABITAT LOWLAND MEADOWS
Type: MG1e
Status: Maintained

PRIORITY HABITAT LOWLAND MEADOWS
Type: MG1e
Status: Maintained

RENATURED CALCAREOUS GRASSLAND
Type: Existing land
Status: Re-natured to calcareous grassland

NON PRIORITY HABITAT

ORIGINATOR
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NE1 1EW

Client
Cumberland Council

Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Visitor Centre 1:500

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:500	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1301

Work Stage	Status	Revision
Stage 3	Planning	P03



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07/04/2025

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07/04/25	P03		Issued for planning	MDM

KEY

GENERAL INFORMATION

- **APPLICATION BOUNDARY**

HARDWORKS

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  Dims: As existing
- S3.0 — **S3.0 - TIMBER BOARDWALK (P)**
  Location: To sand dune raised walkway
  Dims: 1.8m wide w/ low upstand
- S4.0 — **S4.0 - VEHICULAR MACADAM (V)**
  Location: Visitor Centre car park / Access Road Trench
  Dims: 1.5m wide trench cover w/ passing places
- S5.0 — **S5.0 - VEHICULAR ROUTE (MACADAM) (V)**
  Assumed: Some resurfacing as per S4.0 specification
  Location: To access road from Mainsgate Road to visitor centre - existing surface made good
  Dims: 4.8m wide
- S6.0 — **S6.0 - NATURAL STONE PAVING (P)**
  Location: To Towsey Hole Windmill
- S7.0 — **S7.0 - INSITU CONCRETE w/ SMOOTH FINISH (P)**
  Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse
- S7.1 — **S7.1 - INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
  Location: To Visitor Centre / Whiterock Junction
- S8.0 — **S8.0 - REINFORCED GRAVEL (P)**
  Location: To Visitor Centre car park / Annie Lowther Hide
- S9.0 — **S9.0 - RAISED STEEL WALKWAY w TIMBER EDGE (P)**
  Location: To Visitor Centre
- SE — **SE - SURFACE EXISTING**
  Location: As noted

HABITAT TYPES

- **DENSE CONTINUOUS SCRUB**
  Type: A2.1
  Status: Maintained
- **MOSAIC: SAND DUNE GRASSLAND / SAND DUNE SCRUB**
  Type: H6.5 / H6.7
  Status: Maintained
- **UNIMPROVED CALCAREOUS GRASSLAND**
  Type: B3.1
  Status: Maintained
- **QUARRY**
  Type: I1.2
  Status: Maintained
- **HIGHLIGHTED SPECIES**
  Type: Montbretia
  Status: Removed
- **HIGHLIGHTED SPECIES**
  Type: Sea Buckthorn
  Status: Removed

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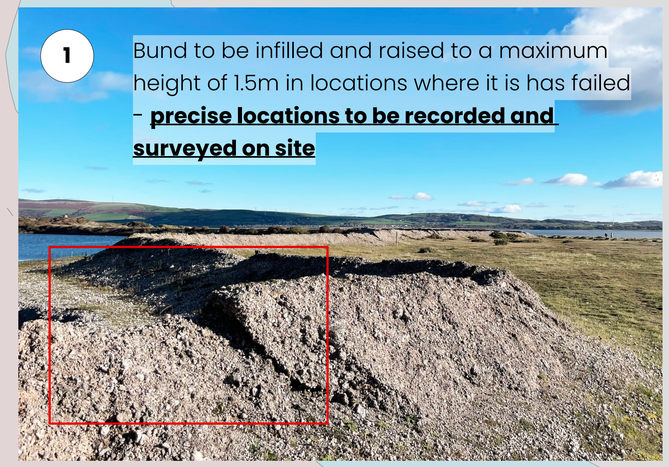
Project
The Iron Line
Millom, Cumbria

Drawing Title
GA | Lighthouse & Tern Island Hide - Overview

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:500	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1302

Work Stage	Status	Revision
Stage 3	Planning	P03



1

Bund to be infilled and raised to a maximum height of 1.5m in locations where it is has failed - **precise locations to be recorded and surveyed on site**

I1.2 - Quarry

Sea buckthorn to be removed

B3.1 - Unimproved calcareous grassland.

A2.1 - Dense / continuous scrub

A-A1

S1.0

S2.0

S7.0

SE

0m 10m 25m 50m 100m 150m

NOTES:

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THIS DRAWING WAS PLOTTED ON:
07/04/2025

REVISION HISTORY

DATE	REV	ZONE	DESCRIPTION	CHK
03/06/24	P01		Preliminary Issue	MDM
04/04/25	P02		Revised Issue	CE
07/04/25	P03		Issued for planning	MDM

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

HARDWORKS

S1.0 **S1.0 - SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P)**
Location: To primary pedestrian routes
Dims: 1.5m wide

S2.0 **S2.0 - STONE TO DUST SURFACE (V)**
Assumed: Existing surface planed - pot holes filled - Type 1 dressing with Grano Dust surface finish
Location: To Byway
Dims: As existing

S3.0 **S3.0 - TIMBER BOARDWALK (P)**
Location: To sand dune raised walkway
Dims: 1.8m wide w/ low upstand

S4.0 **S4.0 - VEHICULAR MACADAM (V)**
Location: Visitor Centre car park / Access Road Trench
Dims: 1.5m wide trench cover w/ passing places

S5.0 **S5.0 - VEHICULAR ROUTE (MACADAM) (V)**
Assumed: Some resurfacing as per S4.0 specification
Location: To access road from Mainsgate Road to visitor centre - existing surface made good
Dims: 4.8m wide

S6.0 **S6.0 - NATURAL STONE PAVING (P)**
Location: To Towsey Hole Windmill

S7.0 **S7.0 - INSITU CONCRETE w/ SMOOTH FINISH (P)**
Location: To in ground railway details / Visitor Centre / Hodbarrow Lighthouse

S7.1 **S7.1 - INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (P / V)**
Location: To Visitor Centre / Whiterock Junction

S8.0 **S8.0 - REINFORCED GRAVEL (P)**
Location: To Visitor Centre car park / Annie Lowther Hide

S9.0 **S9.0 - RAISED STEEL WALKWAY w TIMBER EDGE (P)**
Location: To Visitor Centre

SE **SE - SURFACE EXISTING**
Location: As noted

KEY

GENERAL INFORMATION

APPLICATION BOUNDARY

SLAG BUND REMEDIATION WORKS

SLAG BUND - EXISITING

SLAG BUND - INCREASED HEIGHT
To a maximum of 1500mm

SLAG BUND - INFILL

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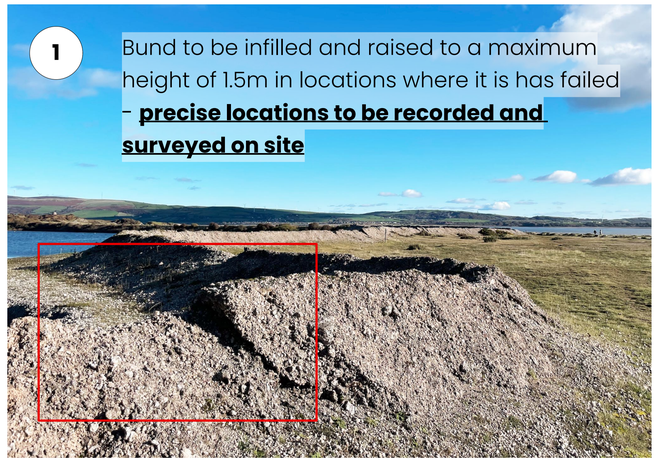
Project
The Iron Line
Millom, Cumbria

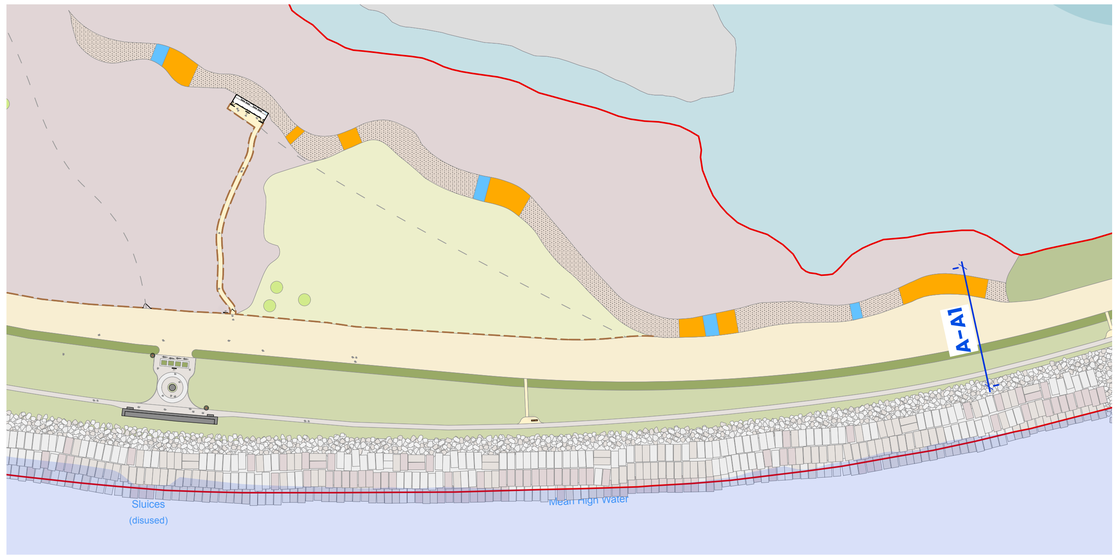
Drawing Title
GA | Lighthouse & Tern Island Hide - Slag Bund

Created By	Checked By	Scale	Sheet Size
MDM	CL	1:500	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
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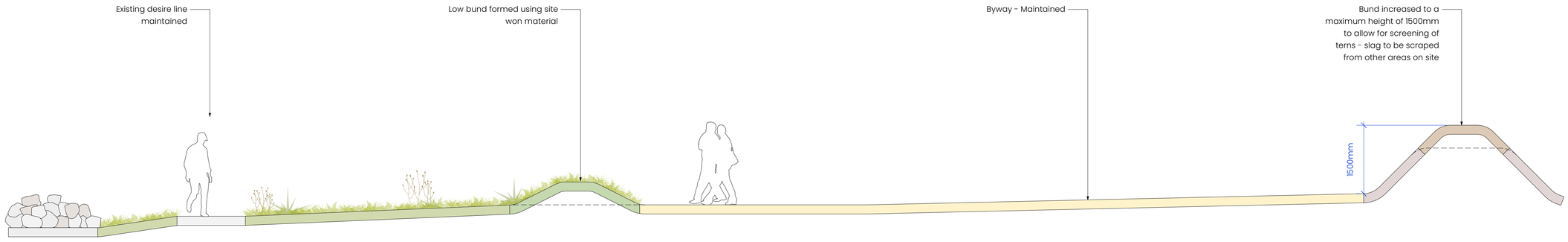
Work Stage	Status	Revision
Stage 3	Planning	P03





D01 Location Map
Scale: 1:100





D02 Section A-A1
Scale: 1:50

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REVISION HISTORY

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07/04/25	P03		Issued for planning	MDM

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Project
The Iron Line
Millom, Cumbria

Drawing Title
S | Sea Wall Cross Section

Created By	Checked By	Scale	Sheet Size
MDM	CL	As Noted	A1

Project Number	Originator	Volume	Level	File Type	Discipline	Number
289	LYR	XX	ZZ	DWG	L	1304

Work Stage	Status	Revision
Stage 3	Planning	P03

Appendix B - Screening Criteria for Imported Materials

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Human Health GQRA Rationale and Hierarchy

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Background

Detailed guidance on human health risk assessment is available within several documents, published by both the Environment Agency, Defra, CL:AIRE, LQM/CIEH and Public Health England as referenced below (references a-h).

A Generic Quantitative Risk Assessment (GQRA) is carried out for the Potential Contaminant Linkages (PCLs) investigated by screening of soil contamination data against relevant Generic Assessment Criteria where available.

Generic Assessment Criteria are available for a range of different land use scenarios, soil organic matter (SOM) and soil types. Curtins have adopted available GACs for a sandy loam soil at 1%, 2.5% and 6% SOM using various sources.

GAC Hierarchy

A summary of and hierarchy for adopted GACs is identified below:

i) **Category 4 Screening Levels (C4SLs):** In March 2014 Defra published C4SLs for arsenic, benzene, benzo(a)pyrene, cadmium, hexavalent chromium, and lead as part of the 'Phase 1 Project'. These values were derived to support the revised Part 2A Statutory Guidance issued in 2012 in which four categories of contaminated land are included, ranging from Category 1 (significant/high risk) to Category 4 (low risk). In 2018 the 'Phase 2 Project' commenced which aims to develop C4SLs for a range of further contaminants. Currently available Phase 2 C4SLs include vinyl chloride, trichloroethene, tetrachloroethene, naphthalene, cis-1,2 dichloroethene, trans 1, 2 dichloroethene and per / polyfluoroalkyl substances (PFAS) . Where contaminant concentrations do not exceed C4SLs, there is no risk that the land poses a significant possibility of significant harm (SPoSH) or the level of risk is low, as such land can be demonstrated to be in Category 4 and cannot be determined as contaminated land. The C4SLs are proposed to be more pragmatic (whilst still strongly precautionary) in comparison with SGVs and S4UL's outlined below.

ii) **Suitable for Use Levels (S4ULs):** In 2015 LQM and the Chartered Institute of Environmental Health published generic assessment criteria for 89 substances including metals, BTEX, TPH, polycyclic aromatic hydrocarbons, phenols, chlorinated solvents and other volatile organic compounds. The S4ULs represent a minimal risk to long term human health, derived using health criteria values. The methodology for deriving the S4ULs is based on the Environment Agency CLEA model with consideration of developments in UK human health exposure assessment, in particular the additional land uses and exposure assumptions.

iii) **Other Supplementary Screening Criteria:** In addition to those developed by LQM/CIEH (outlined above), other third party organisations have derived SSVs for a wider range of contaminants and land uses using the CLEA Model. Curtins have adopted these numbers where applicable, including those developed EIC/AGS/CL:AIRE and SoBRA published thresholds.

Alternative Assessment Approaches

PAH – Benzo(a)pyrene Surrogate Marker Assessment

In September 2017 Public Health England (PHE) (Ref. h) published guidance for the use of a surrogate marker approach to assess the risk posed by soil contamination with the genotoxic polycyclic aromatic hydrocarbons (PAHs). The guidance indicates that the use of a marker compound, such as Benzo(a)pyrene, provides a consistent indicator of the amount of 7 other genotoxic PAHs commonly tested for in soil including benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(123cd)pyrene and benzo(ghi)perylene.

Where PAH concentrations of these 8 no. PAHs are present within pre-determined ratios in soil, provided in the guidance, this approach is used, comparing soil concentrations of the marker compound with a Category 4 Screening Level, or site specific assessment criteria. An individual compound assessment is carried out for other PAH compounds not considered in the PHE guidance.

An individual compound assessment is carried out for all PAH compounds where pre-determined ratios are not met for the surrogate marker approach.

Notes

Curtins Generic Assessment Criteria provide further information and notes to be read in conjunction with this assessment rationale.

Human Health GQRA Rationale and Hierarchy

Curtins

References

a) Environmental Agency. (2009) Contaminated Land Exposure Assessment (CLEA) v1.071 model.

b) Environment Agency. (2009) Human Health Toxicological Assessment of Contaminants in Soil (report no. SC050021/SR2).

c) Environment Agency. (2009) Updated Technical Background to the CLEA Model (report no.SC050021/SR3).

d) Environment Agency (2005) The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils Science Report P5-080/TR3.

e) Department of Environment Food and Rural Affairs (DEFRA). (2012) Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (report no. PB13735).

f) CL:AIRE (2014) Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, SP1010 Rev 2.

g) LQM & CIEH (2015) S4ULs for Human Health Risk Assessment.

h) Public Health England (2017) Contaminated Land Information Sheet: Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs

Curtins

Adopted Soil Generic Assessment Criteria
Sandy loam with 1% SOM

*Refer to Note 13 where Solubility and Vapour Saturation Limits are Exceeded. These values are not GAC and are not to be used as GAC.

Contaminants	Residential with Home Grown Produce	Residential Without Home Grown Produce	Allotments	Commercial	Public open space (Residential)	Public park POS$_{park}$	Solubility Saturation Limit (mg/kg)	Vapour Satuation Limit (mg/kg)
Metals, Semi-Metals & non-metals								
Antimony	-	550	-	7500	-	-		
Arsenic	37	40	49	640	79	170		
Beryllium	1.7	1.7	35	12	2.2	63		
Boron	290	11000	45	240000	21000	46000		
Cadmium	22	150	3.9	410	220	880		
Chromium III	910	910	18000	8600	1500	33000		
Chromium VI	21	21	170	49	21	250		
Copper	2400	7100	520	68000	12000	44000		
Lead	200	310	80	2300	630	1300		
Mercury (elemental)	1.2	1.2	21	58	16	30		25.8
Mercury (inorganic)	40	56	19	1100	120	240		
Methylmercury	11	15	6	320	40	68		
Nickel	130	180	53	980	230	800		
Selenium	250	430	88	12000	1100	1800		
Vanadium	410	1200	91	9000	2000	5000		
Zinc	3700	40000	620	730000	81000	170000		
Inorganic Compounds								
Cyanide	24	24	24	1400	24	24		
Organic contaminants								
Aliphatic Risk Banded Hydrocarbons - TPH CWG method								
Aliphatic EC5 - EC6 TPHs	42	42	730	3200	570000	95000	304	
Aliphatic EC>6 - EC8 TPHs	100	100	2300	7800	600000	150000	144	
Aliphatic EC>8 - EC10 TPHs	27	27	320	2000	13000	14000	78	
Aliphatic EC>10-EC12 TPHs	130	130	2200	9700	13000	21000	48	
Aliphatic EC>12-EC16 TPHs	1100	1100	11000	59000	13000	25000	24	
Aliphatic EC>16 - EC35 TPHs	65000	65000	260000	1600000	250000	450000	8.48	
Aliphatic EC>35 - EC44 TPHs	65000	65000	260000	1600000	250000	450000	8.48	
Aromatic Risk Banded Hydrocarbons - TPH CWG method								
Aromatic EC5 - EC7 TPHs	70	370	13	26000	56000	76000	1220	
Aromatic EC>7 - EC8 TPHs	130	860	22	56000	56000	87000		869
Aromatic EC>8 - EC10 TPHs	34	47	8.6	3500	5000	7200		613
Aromatic EC10 - EC12 TPHs	74	250	13	16000	5000	9200	364	
Aromatic EC12 - EC16 TPHs	140	1800	23	36000	5100	10000	169	
Aromatic EC>16 - EC21 TPHs	260	1900	46	28000	3800	7600		
Aromatic EC>21 - EC35 TPHs	1100	1900	370	28000	3800	7800		
Aromatic EC>35 - EC44 TPHs	1100	1900	370	28000	3800	7800		
Long Chain Aliphatic and Aromatic Hydrocarbons								
Aliphatic and Aromatic EC >44-70	1600	1900	1200	28000	3800	7800		
Aromatic Hydrocarbons								
Benzene	0.2	0.89	0.039	27	140	190		
Ethyl benzene	47	83	16	5700	24000	17000		518
Toluene	130	880	22	56000	56000	87000		869
Xylene	56	79	28	5900	41000	17000	478 (o-xylene) 576 (p-xylene)	625 (m-xylene)
MTBE	49	73	23	7900			20400	
Phenol	280	750	66	760	760	760		
Polycyclic Aromatic Hydrocarbons (PAH) - Benzo(a)pyrene Surrogate Marker Approach, with reference to C4SL PAH Surrogate Marker Check Sheet where appropriate								
Benzo(a)Pyrene (C4SL Surrogate Marker Approach)	5	5.3	5.7	77	10	21		
Naphthalene	15	15	65	1600	11000	800	76.4	
Acenaphthylene	170	2900	28	83000	15000	29000	86.1	
Acenaphthene	210	3000	34	84000	15000	29000	57	
Fluorene	170	2800	27	63000	9900	20000	30.9	
Phenanthrene	95	1300	15	22000	3100	6200	36	
Anthracene	2400	31000	380	520000	74000	150000		1.17
Fluoranthene	280	1500	52	23000	3100	6300		
Pyrene	620	3700	110	54000	7400	15000		
Polycyclic Aromatic Hydrocarbons (PAH) - Individual Compound Assessment								
Naphthalene	15	15	65	1600	11000	800	76.4	
Acenaphthylene	170	2900	28	83000	15000	29000	86.1	
Acenaphthene	210	3000	34	84000	15000	29000	57	
Fluorene	170	2800	27	63000	9900	20000	30.9	
Phenanthrene	95	1300	15	22000	3100	6200	36	
Anthracene	2400	31000	380	520000	74000	150000		1.17
Fluoranthene	280	1500	52	23000	3100	6300		
Pyrene	620	3700	110	54000	7400	15000		
Benzo(a)anthracene	7.2	11	2.9	170	29	49		
Chrysene	15	30	4.1	350	57	93		
Benzo(b)fluoranthene	2.6	3.9	0.99	44	7.1	13		
Benzo(k)fluoranthene	77	110	37	1200	190	370		
Benzo(a)pyrene (only)	2.2	3.2	0.97	35	5.7	11		
Indeno(123cd)pyrene	27	45	9.5	500	82	150		
Dibenzo(ah)anthracene	0.24	0.31	0.14	3.5	0.57	1.1		
Benzo(ghi)perylene	320	360	290	3900	640	1400		
Chlorinated Aliphatic Hydrocarbons								
Chloroethene (Vinyl chloride)	0.0064	0.015	0.0017	1.1	7.8	18		
1,1-Dichloroethene (DCE)	0.23	0.23	2.8	26			2230	
Cis 1,2, Dichloroethene (DCE)	0.46	0.5	0.89	38	3800	2800	3940	
Trans 1,2, Dichloroethene (DCE)	0.9	0.93	3.7	69	13000	5600	3420	
Trichloroethene (TCE)	0.0093	0.0097	0.032	0.73	76	41		
Tetrachlorethene (PCE)	0.31	0.32	2	24	3200	1400		
1,1,1,2 Tetrachlorethane	1.2	1.5	0.79	110	1400	1500		
1,1,1 Trichlorethane	8.8	9	48	660	140000	57000		1425
1,2-Dichloroethane (Ethylene Dichloride)	0.11	0.16	0.054	12	300	300		
Tetrachloromethane	0.026	0.026	0.45	2.9	890	190		
Trichloromethane (Chloroform)	0.91	1.2	0.42	99	2500	2600		
Per- and Polyfluoroalkyl Substances (PFAS)								
Perfluorooctanoic Acid (PFOA)	0.0076	0.041	0.0014	0.6	0.079	0.17		
Perfluorononanoic Acid (PFNA)	0.013	0.041	0.0027	0.6	0.079	0.17		
Perfluorohexane Sulfonic Acid (PFHxS)	0.0081	0.041	0.0015	0.6	0.079	0.17		
Perfluorooctane Sulfonic Acid (PFOS)	0.0073	0.041	0.0013	0.6	0.079	0.17		

Curtins

Adopted Soil Generic Assessment Criteria
Sandy loam with 2.5% SOM

*Refer to Note 13 where Solubility and Vapour Saturation Limits are Exceeded. These values are not GAC and are not to be used as GAC.

Contaminants	Residential with Home Grown Produce	Residential Without Home Grown Produce	Allotments	Commercial	Public open space (Residential)	Public park POS$_{park}$	Solubility Saturation Limit (mg/kg)	Vapour Satuation Limit (mg/kg)
Metals, Semi-Metals & non-metals								
Antimony		550		7500				
Arsenic	37	40	49	640	79	170		
Beryllium	1.7	1.7	35	12	2.2	63		
Boron	290	11000	45	240000	21000	46000		
Cadmium	22	150	3.9	410	220	880		
Chromium III	910	910	18000	8600	1500	33000		
Chromium VI	21	21	170	49	21	250		
Copper	2400	7100	520	68000	12000	44000		
Lead	200	310	80	2300	630	1300		
Mercury (elemental)	1.2	1.2	21	58	16	30		25.8
Mercury (inorganic)	40	56	19	1100	120	240		
Methylmercury	11	15	6	320	40	68		
Nickel	130	180	53	980	230	800		
Selenium	250	430	88	12000	1100	1800		
Vanadium	410	1200	91	9000	2000	5000		
Zinc	3700	40000	620	730000	81000	170000		
Inorganic Compounds								
Cyanide	24	24	24	1400	24	24		
Organic contaminants								
Aliphatic Risk Banded Hydrocarbons - TPH CWG method								
Aliphatic EC5 - EC6 TPHs	78	78	1700	5900	590000	130000	558	
Aliphatic EC>6 - EC8 TPHs	230	230	5600	17000	610000	220000	322	
Aliphatic EC>8 - EC10 TPHs	65	65	770	4800	13000	18000		190
Aliphatic EC>10-EC12 TPHs	330	330	4400	23000	13000	23000		118
Aliphatic EC>12-EC16 TPHs	2400	2400	13000	82000	13000	25000	59	
Aliphatic EC>16 - EC35 TPHs	92000	92000	270000	1700000	250000	480000	21	
Aliphatic EC>35 - EC44 TPHs	92000	92000	270000	1700000	250000	480000	21	
Aromatic Risk Banded Hydrocarbons - TPH CWG method								
Aromatic EC5 - EC7 TPHs	140	690	27	46000	56000	84000	2260	
Aromatic EC>7 - EC8 TPHs	290	1800	51	110000	56000	95000	1920	
Aromatic EC>8 - EC10 TPHs	83	110	21	8100	5000	8500		1500
Aromatic EC10 - EC12 TPHs	180	590	31	28000	5000	9700	899	
Aromatic EC12 - EC16 TPHs	330	2300	57	37000	5100	10000	419	
Aromatic EC>16 - EC21 TPHs	540	1900	110	28000	3800	7700		
Aromatic EC>21 - EC35 TPHs	1500	1900	820	28000	3800	7800		
Aromatic EC>35 - EC44 TPHs	1500	1900	820	28000	3800	7800		
Long Chain Aliphatic and Aromatic Hydrocarbons								
Aliphatic and Aromatic EC >44-70	1800	1900	2100	28000	3800	7800		
Aromatic Hydrocarbons								
Benzene	0.17	0.7	0.034	47	72	100		
Ethyl benzene	110	190	39	13000	24000	22000		1220
Toluene	290	1900	51	110000	56000	95000		1920
Xylene	130	180	67	14000	42000	23000	1120	1470
MTBE	84	120	44	13000			33100	
Phenol	550	1300	140	1500	1500	1500		
Polycyclic Aromatic Hydrocarbons (PAH) - Benzo(a)pyrene Surrogate Marker Approach, with reference to C4SL PAH Surrogate Marker Check Sheet where appropriate								
Benzo(a)Pyrene (C4SL Surrogate Marker Approach)	5	5.3	5.7	77	10	21		
Naphthalene	36	36	130	3700	15000	1200	183	
Acenaphthylene	420	4600	69	97000	15000	30000	212	
Acenaphthene	510	4700	85	97000	15000	30000	141	
Fluorene	400	3800	67	68000	9900	20000	76.5	
Phenanthrene	220	1500	38	22000	3100	6200		
Anthracene	5400	35000	950	540000	74000	150000		
Fluoranthene	560	1600	130	23000	3100	6300		
Pyrene	1200	3800	270	54000	7400	15000		
Polycyclic Aromatic Hydrocarbons (PAH) - Individual Compound Assessment								
Naphthalene	36	36	130	3700	15000	1200	183	
Acenaphthylene	420	4600	69	97000	15000	30000	212	
Acenaphthene	510	4700	85	97000	15000	30000	141	
Fluorene	400	3800	67	68000	9900	20000	76.5	
Phenanthrene	220	1500	38	22000	3100	6200		
Anthracene	5400	35000	950	540000	74000	150000		
Fluoranthene	560	1600	130	23000	3100	6300		
Pyrene	1200	3800	270	54000	7400	15000		
Benzo(a)anthracene	11	14	6.5	170	29	56		
Chrysene	22	31	9.4	350	57	110		
Benzo(b)fluoranthene	3.3	4	2.1	44	7.2	15		
Benzo(k)fluoranthene	93	110	75	1200	190	410		
Benzo(a)pyrene (only)	2.7	3.2	2	35	5.7	12		
Indeno(123cd)pyrene	36	46	21	510	82	170		
Dibenzo(ah)anthracene	0.28	0.32	0.27	3.6	0.57	1.3		
Benzo(ghi)perylene	340	360	470	4000	640	1500		
Chlorinated Aliphatic Hydrocarbons								
Chloroethene (Vinyl chloride)	0.01	0.019	0.0031	1.4	7.8	19		
1,1-Dichloroethene (DCE)	0.4	0.41	5.6	46			3940	
Cis 1,2, Dichloroethene (DCE)	0.78	0.84	1.7	64	3800	2400	6610	
Trans 1,2, Dichloroethene (DCE)	1.6	1.7	0.75	120	13000	7000	6170	
Trichloroethene (TCE)	0.02	0.02	0.072	1.5	78	54		
Tetrachlorethene (PCE)	0.7	0.71	4.8	55	3300	1900		
1,1,1,2 Tetrachlorethane	2.8	3.5	1.9	250	1400	1800		
1,1,1 Trichlorethane	18	18	110	1300	140000	76000		2915
1,2-Dichloroethane (Ethylene Dichloride)	0.18	0.24	0.1	17	210	330		
Tetrachloromethane	0.056	0.056	1	6.3	920	270		
Trichloromethane	1.7	2.1	0.83	170	2500	2800		
PFAS								
Perfluorooctanoic Acid (PFOA)	0.0076	0.041	0.0014	0.6	0.079	0.17		
Perfluorononanoic Acid (PFNA)	0.013	0.041	0.0027	0.6	0.079	0.17		
Perfluorohexane Sulfonic Acid (PFHxS)	0.0081	0.041	0.0015	0.6	0.079	0.17		
Perfluorooctane Sulfonic Acid (PFOS)	0.0073	0.041	0.0013	0.6	0.079	0.17		

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Adopted Soil Generic Assessment Criteria
Sandy loam with 6% SOM

*Refer to Note 13 where Solubility and Vapour Saturation Limits are Exceeded. These values are not GAC and are not to be used as GAC.

Contaminants	Residential with Home Grown Produce	Residential Without Home Grown Produce	Allotments	Commercial	Public open space (Residential)	Public park POS$_{park}$	Solubility Saturation Limit (mg/kg)	Vapour Satuation Limit (mg/kg)
Metals, Semi-Metals & non-metals								
Antimony		550		7500				
Arsenic	37	40	49	640	79	170		
Beryllium	1.7	1.7	35	12	2.2	63		
Boron	290	11000	45	240000	21000	46000		
Cadmium	22	150	3.9	410	220	880		
Chromium III	910	910	18000	8600	1500	33000		
Chromium VI	21	21	170	49	21	250		
Copper	2400	7100	520	68000	12000	44000		
Lead	200	310	80	2300	630	1300		
Mercury (elemental)	1.2	1.2	21	58	16	30		25.8
Mercury (inorganic)	40	56	19	1100	120	240		
Methylmercury	11	15	6	320	40	68		
Nickel	130	180	53	980	230	800		
Selenium	250	430	88	12000	1100	1800		
Vanadium	410	1200	91	9000	2000	5000		
Zinc	3700	40000	620	730000	81000	170000		
Inorganic Compounds								
Cyanide	24	24	24	1400	24	24		
Organic Compounds								
Aliphatic Risk Banded Hydrocarbons - TPH CWG method								
Aliphatic EC5 - EC6 TPHs	160	160	3900	12000	600000	180000	1150	
Aliphatic EC>6 - EC8 TPHs	530	530	13000	40000	620000	320000	736	
Aliphatic EC>8 - EC10 TPHs	150	150	1700	11000	13000	21000		451
Aliphatic EC>10-EC12 TPHs	760	770	7300	47000	13000	24000		283
Aliphatic EC>12-EC16 TPHs	4300	4400	13000	90000	13000	26000	142	
Aliphatic EC>16 - EC35 TPHs	110000	110000	270000	1800000	250000	490000		
Aliphatic EC>35 - EC44 TPHs	110000	110000	270000	1800000	250000	490000		
Aromatic Risk Banded Hydrocarbons - TPH CWG method								
Aromatic EC5 - EC7 TPHs	300	1400	57	86000	56000	92000	4710	
Aromatic EC>7 - EC8 TPHs	660	3900	120	180000	56000	100000		4360
Aromatic EC>8 - EC10 TPHs	190	270	51	17000	5000	9300		3580
Aromatic EC10 - EC12 TPHs	380	1200	74	34000	5000	10000	2150	
Aromatic EC12 - EC16 TPHs	660	2500	130	38000	5000	10000		
Aromatic EC>16 - EC21 TPHs	930	1900	260	28000	3800	7800		
Aromatic EC>21 - EC35 TPHs	1700	1900	1600	28000	3800	7900		
Aromatic EC>35 - EC44 TPHs	1700	1900	1600	28000	3800	7900		
Long Chain Aliphatic and Aromatic Hydrocarbons								
Aliphatic and Aromatic EC >44-70	1900	1900	3000	28000	3800	7900		
Aromatic Hydrocarbons								
Benzene	0.87	3.3	0.18	98	140	230		
Ethyl benzene	260	440	91	27000	25000	27000		2840
Toluene	690	3900	120	180000	56000	100000		4360
Xylene	310	430	160	30000	43000	31000	2620	
MTBE	160	220	90	24000			62700	
Phenol	420	2300	280	3200	3200	3200		
Polycyclic Aromatic Hydrocarbons (PAH) - Benzo(a)pyrene Surrogate Marker Approach, with reference to C4SL PAH Surrogate Marker Check Sheet where appropriate								
Benzo(a)Pyrene (C4SL Surrogate Marker Approach)	5	5.3	5.7	77	10	21		
Naphthalene	85	85	200	8400	17000	1900	432	
Acenaphthylene	920	6000	160	100000	15000	30000	506	
Acenaphthene	1100	6000	200	100000	15000	30000	336	
Fluorene	860	4500	160	71000	9900	20000	183	
Phenanthrene	440	1500	90	23000	3100	6300		
Anthracene	11000	37000	2200	540000	74000	150000		
Fluoranthene	890	1600	290	23000	3100	6400		
Pyrene	2000	3800	620	54000	7400	15000		
Polycyclic Aromatic Hydrocarbons (PAH) - Individual Compound Assessment								
Naphthalene	85	85	200	8400	17000	1900	432	
Acenaphthylene	920	6000	160	100000	15000	30000	506	
Acenaphthene	1100	6000	200	100000	15000	30000	336	
Fluorene	860	4500	160	71000	9900	20000	183	
Phenanthrene	440	1500	90	23000	3100	6300		
Anthracene	11000	37000	2200	540000	74000	150000		
Fluoranthene	890	1600	290	23000	3100	6400		
Pyrene	2000	3800	620	54000	7400	15000		
Benzo(a)anthracene	13	15	13	180	29	62		
Chrysene	27	32	19	350	57	120		
Benzo(b)fluoranthene	3.7	4	3.9	45	7.2	16		
Benzo(k)fluoranthene	100	110	130	1200	190	440		
Benzo(a)pyrene (only)	3	3.2	3.5	36	5.7	13		
Indeno(123cd)pyrene	41	46	39	510	82	180		
Dibenzo(ah)anthracene	0.3	0.32	0.43	3.6	0.58	1.4		
Benzo(ghi)perylene	350	360	640	4000	640	1600		
Chlorinated Aliphatic Hydrocarbons								
Chloroethene (Vinyl chloride)	0.017	0.029	0.0058	2.2	7.8	19		
1,1-Dichloroethene (DCE)	0.82	0.82	12	92			7940	
Cis 1,2, Dichloroethene (DCE)	1.5	1.6	3.6	120	3900	3100	12900	
Trans 1,2, Dichloroethene (DCE)	3.3	3.4	16	260	13000	9100	12600	
Trichloroethene (TCE)	0.043	0.045	0.16	3.4	79	69		
Tetrachlorethene (PCE)	1.6	1.6	11	130	3400	2500		
1,1,1,2 Tetrachlorethane	6.4	8.2	4.4	560	1400	2100		
1,1,1 Trichlorethane	39	40	240	3000	140000	100000		6392
1,2-Dichloroethane (Ethylene Dichloride)	0.31	0.41	0.19	29	310	380		
Tetrachloromethane	0.13	0.13	2.4	14	950	400		
Trichloromethane	3.4	4.2	1.7	350	2500	3100		
PFAS								
Perfluorooctanoic Acid (PFOA)	0.0076	0.041	0.0014	0.6	0.079	0.17		
Perfluorononanoic Acid (PFNA)	0.013	0.041	0.0027	0.6	0.079	0.17		
Perfluorohexane Sulfonic Acid (PFHxS)	0.0081	0.041	0.0015	0.6	0.079	0.17		
Perfluorooctane Sulfonic Acid (PFOS)	0.0073	0.041	0.0013	0.6	0.079	0.17		

Notes

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1) All Values are in mg/kg, reported to 2 significant figures.
2) Numbers in bold are C4SLs, Numbers in italics are S4ULs, Numbers underlined are EIC/AGS/CL:AIRE GACs, Numbers in red are SoBRA Acute Generic Assessment Criteria.
3) Assumptions and key notes made when deriving the Generic Assessment Criteria are contained within the relevant guidance documents, references:
   a) Contaminated Land: Applications in Real Environments (2014) SP1010 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, Final Project Report (Revision 2b)
   b) Land Quality Management Ltd. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment.
   c) CL:AIRE, EIC, AGS (2010) Soil Generic Assessment Criteria for Human Health Risk Assessment.
   d) Society of Brownfield Risk Assessment (2020) Development of Acute Generic Assessment Criteria for Assessing Risks to Human Health from Contaminants in Soil.
   e) Environment Agency (2009) Human Health Toxicological Assessment of Contaminants in Soil, Science Report - SC050021/SR2.
4) Generic Assessment Criteria listed in the following order of preference: C4SLs, S4ULs, CL:AIRE/AGS/EIC Generic Assessment Criteria, Other relevant Generic Assessment Criteria where GACS associated with the prioritised GACs are not available as outlined further in Curtins Rationale and Hierarchy notes.
5) To use Benzo(a)pyrene as a surrogate marker for PAH contamination, the assumptions set out in the relevant C4SL documentation must be met. A C4SL PAH surrogate marker checklist is appended.
6) Naphthalene is a volatile PAH. The C4SL values are derived on the basis of chronic exposure and risks to human health, and do not explicitly account for acute risks (e.g. a one off ingestion of a significant amount of soil by a young child) where the inhalation pathway is the main risk driver. Further consideration of the acute risk may be required in external settings (POS_{park} and POS_{resi}) where the GAC is substantially greater than the residential equivalent, to account for the possibility of acute exposure to the ingestion of naphthalene. The theoretical solubility saturation limit of naphthalene in soil is substantially lower than the GAC value, and therefore it is likely that free phase contamination would be present where the GAC is exceeded. In such a situation, it is unlikely that the product would remain in-situ untreated, and consideration of remediation / mitigation methods would be required.
7) Where the C4SL surrogate marker checklist indicates the PAH ratios are not suitable, individual PAH compounds must be assessed individually against the relevant contaminant specific assessment criteria.
8) Risk associated with additive effects of TPH contamination needs to be assessed in addition to the individual bandings, using the following equation:

$$HI = \sum HQ\ Fi = \sum \frac{Measured\ concentration, Fi\ (mg/kg)}{Relevant\ GAC\ (mg/kg)} Fi$$

   Where:

   HI = Hazard Index

   HQ = Hazard Quotient

   Fi = Fraction i

   Where the HI > 1, there may be a risk to human health.
9) Exposure to all xylene isomers to be considered together. Values detailed in this table are the lowest (most conservative) of o-, m- and p- xylene isomers.
10) PFAS assessment also uses a hazard index approach to ensure the total exposure from all four PFAS compounds combined does not exceed the $LLTC_{oral}$. Where the hazard index exceeds 1, further consideration or assessment of the risk is required, even where none of the individual C4SL values are exceeded.
11) PFAS C4SL values are interim. The C4SL has been derived using the sum of the four PFAS compounds as the basis of the low level of toxicological concern. The term interim reflects concerns raised by the Committee on Toxicity (COT) and the fact that further work by the COT and others may results in the need for the LLTC to be updated.
12) Generic Assessment Criteria assume no free phase contamination is present. Where free phase contamination is present, further assessment may be required.
13) Solubility Saturation Limit and Vapour Saturation Limit are provided in accordance with relevant guidance documents. Where these values are exceeded, and the vapour pathway is an important contributing pathway to exposure, then the following should be considered:
   - Free phase contamination may be present
   - Exposure from vapour pathways will be over predicted.
   - Where the vapour pathway is >90% of exposure then it is unlikely that the relevant HCV will be exceeded at soul concentrations at least a factor of ten higher than the relevant HCV.

   Additional assessment should be undertaken where this is the case, with consideration that:
   - Exposure is unlikely to reach the relevant HCV and the risk based on the assumed conceptual model is likely to be negligible.
   - Vapour pathway exposure should be calculated using algorithms suitable for free phase or NAPL sources
   - Screening could be considered using the lower saturation limit, which is the approach adopted by the USEPA. However, this may not be practical in many cases because of very low limits and is in any case highly conservative.

   Where the vapour pathway is the only exposure pathway considered then effective assessment criteria should be derived manually in accordance with guidance outlined in CLEA Science Report SC050021/SR4