Steel House Park & Ride
Flood Risk Assessment

Final

September 2022

www.jbaconsulting.com

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Revision History

Revision Ref/Date	Amendments	Issued to
16 September 2022	Final Report	Lauren Carr-Duffy
22 September 2022	Revised for adjusted site boundary and layout	Lauren Carr-Duffy

Contract

This report describes work commissioned by Lauren Carr-Duffy, on behalf of South Tees Development Corporation (STDC), by an email dated 23/08/2022. STDC's representative for the contract was Lauren Carr-Duffy. Mark McMillan of JBA Consulting carried out this work.

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Associate Director

Purpose

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1 Introduction

1.1 Terms of Reference

JBA Consulting (JBA) were commissioned by South Tees Development Corporation to prepare a Flood Risk Assessment (FRA) for a proposed development of a Park and Ride facility within the borough of Redcar, Middlesbrough.

This Flood Risk Assessment provides information on all aspects of flood risk pertaining to the site in accordance with the Nation Planning Policy Framework[1] (NPPF) and associated Planning Practice Guidance (PPG) relating to development and flood risk. It is also considers potential flood risk mitigation where necessary and provides recommendations on how the site can be suitably drained and not cause or increase flood risk to others outside the site.

Together, the planning documents stipulate that the development should, at minimum, have a neutral impact on flood risk.

1.2 Reporting Guidelines and Legislation Context

This Flood Risk Assessment (FRA) is consistent with the reporting requirements detailed within the National Planning Policy Framework (NPPF).

The aim of this FRA is present relevant information pertaining to flooding in a clear format that can be reviewed by the Planning Authority and the Environment Agency. It does not guarantee that the proposed development will be acceptable to the Planning Authority and Environment Agency in terms of flood risk and water management.

1 Department of the Communitieis and Local Government (2012) National Planning Policy Framework (NPPF) and Panning Practice Guidance.

2 Site Description

The proposed site is within the former Redcar Steel Works site in Teeside, as shown in Figure 2-1, at NGR 458000 524300. The site is bounded to the north by an existing railway, to the east by Coatham Marsh, the south the A1085 Trunk Road and to the east by Steel House, British Steel's former Teesside headquarters.

The proposed development is approximately 14.14 ha in area and is characterised as grassland with isolated areas of trees.

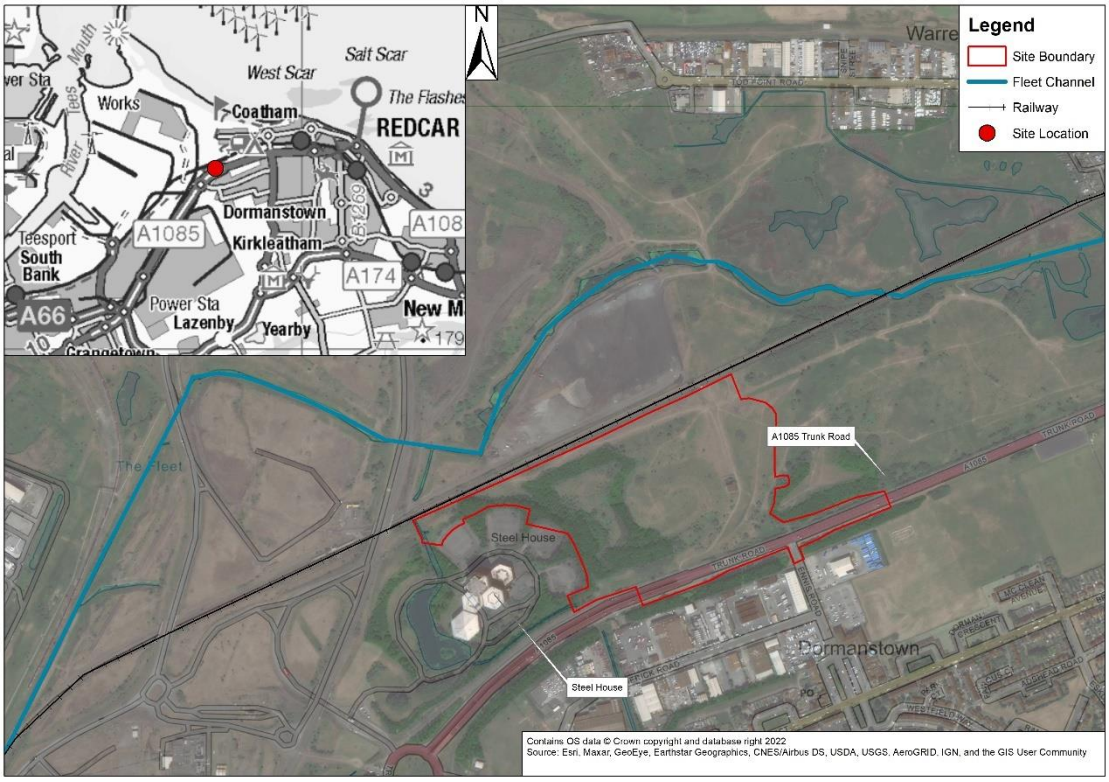

Figure 2-1: Site Location

2.1 Site Topography

Publicly available LiDAR data shows that site levels vary between 3.27 mAOD and 16.90 mAOD. The topographical profile of the site rises from low lying area around the site boundary with high points around the centre of the site and to the eastern boundary. The topographical profile is shown in Figure 2-2.

Figure 2-2: Site Topographical Profile

2.2 Site Geology

The site lies unused as brownfield land. Steel House and the surrounding area is a previously landscaped area, where slag is the main component of the upper layer of ground. There are made ground deposits, mainly slag, of varying thickness with depths of 4m in some places.

Previous land use at the site is steel industry. Other historic uses for the site have been for the storage of materials and freight rail infrastructure uses.

2.3 Existing Drainage

South of the proposed site, the Ash Gill, a mainly culverted watercourse flows under the Trunk Road in the northernly direction before immediately turning west, flowing around Steel House through a pond before flowing north via a culvert under the railway.

North of the railway line, the Fleet Channel flows from east to west Immediately downstream, the Fleet Channel then flows under a rail and road embankment via another culvert.

Areas of the Steel House development have drainage infrastructure that discharge to the Ash Gill channel before discharging to the Fleet Channel.

There is no evident existing drainage within the remainder of the site.

3 Flood Risk Assessment

3.1 Proposed Development

It is proposed to develop the site to provide a Park and Ride Facility and new access from the A1085 Trunk Road. The development will provide approximately 1500 spaces and is shown in Appendix A. Access to the site will be from the Trunk Road.

The NPPF Annex 3 categorises car parks and buildings used for general industry/ professional services as 'Less Vulnerable'.

Less Vulnerable land uses are permitted within Flood Zone 2 and should be assessed against the impact of flooding from events with a return period of between 1 in 100 years (1% AEP), for fluvial risk, or 1 in 200 years (0.5% AEP) for costal risk and 1 in 1000 years (0.1% AEP).

3.2 Historic Flood Risk

Flooding records in the area indicate historic flood risk along the Trunk Road and around Steel House, likely from the Ash Gill. In November 2012, intense rainfall led to flooding with the area around Steel House and the Trunk Road flooding and remaining closed for 2 days following the incident. It is unclear if the structure of Steel House itself was inundated.

No other records of flooding the area have been found.

3.3 Fluvial Flood Risk

The EA Flood Maps show that the site is in Flood Zone 1 from Rivers and Seas. This means that there is a low probability, less than 0.1% AEP, of inundation from this source.

Flood Risk from this source is considered low.

3.4 Coastal Flood Risk

The EA Flood Maps show that the site is in Flood Zone 1 from Rivers and Seas. This means that there is a low probability, less than 0.1% AEP, of inundation from this source.

The EA Coastal Flood Boundary Data Dataset was used to determine the likely extreme still water level for the 1 in 200 year event. The closest datapoint to the site is at NGR 459526, 527459 and provides and estimated level of 4.07 mAOD for 1 in 200 year event.

An impact of climate change is an increase in sea levels. EA guidance[2] on the likely increase in sea levels provides both a high central allowance and an upper end allowance. These are representative of the 70th and 95th percentile projections. For flood risk assessments, the EA require consideration of both allowances when considering the impact of climate change.

The higher central allowance estimates result in a 1 in 200 year extreme sea level of 5.02 mAOD.

The upper end allowance estimates result in a 1 in 200 year extreme sea level of 5.40 mAOD.

More detailed coastal modelling would need to be undertaken to assess the true risk to the site however an indication can be derived from these levels. It would be recommended, where possible that post development site levels be in excess of 5.40 mAOD.

Flood Risk from this source is considered low.

2 https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

3.5 Surface Water Flood Risk

3.5.1 EA Flood Maps

The EA Long Term Flood Maps indicate medium to high risk of isolated surface water ponding within the site boundary as shown in Figure 3-1.

There is a medium probability, between a 1 in 100 year (1% AEP) and 1 in 1000 year (0.1% AEP), of surface water ponding within the site bounds centrally within the topographical low points of the site.

For events with a low probability, having less than 1 in 1000 year return period (0.1%) AEP there are additional areas of the site at risk including the existing car park areas for Steel House in the north west area of the site. There is some isolated ponding along the northern boundary of the site against the existing railway line.

Towards the eastern boundary of the site there is a prominent flow path that results in ponding against the railway. This flow path appears to start within the site boundary and is the result of the site topography.

There is no evidence of external flow paths from outside of the development entering the site. It is considered that the site can be developed and minimise surface water flood risk through the implementation of a suitable drainage strategy.

Figure 3-1: EA Long Term Flood Risk Maps, Extent of Surface Water Flooding

3.5.2 Hydraulic Modelling

Surface water modelling of the Teesworks area has been previously undertaken by JBA Consulting to inform the Water Management Strategy of the greater STDC development.

Preliminary surface water flood mapping was generated using Infoworks Integrated Catchment Modelling (ICM) version 9.5. ICM is an advanced modelling software used to model complicated hydrological and hydraulic systems efficiently. It also allows the combination of natural solutions with piped (network) modelling to suggest improvements to capacity and create scenarios to optimise flood risk management. For the pluvial modelling, the inputs required are a Digital Terrain Model (DTM) to represent the topographical profile of the model domain and rainfall hyetographs.

The DTM was developed using LiDAR 2m spatial resolution data. Denser LiDAR data is available but was not utilised at this high-level stage in the project. ICM using the LiDAR data to generate a mesh of triangular elements of varying size. These allows flat areas to be represented with large elements and undulating areas to be represented with smaller elements thereby reducing the total number of elements required without compromising detail and improving model stability and runtimes. In this case the model domain maximum resultion was set to 100 m^2 and the minimum element area was set to $4m^2$.

Rainfall hyetographs were developed using FEH13 rainfall data from the Lackenby Channel catchment which is considered representative of the wider area.

The model was run for the 1 in 30 year (3.33% AEP), 1 in 100 year (1% AEP) and the 1 in 1000 year (0.1% AEP) rainfall events. The model results in the region of the proposed development are shown in Figures 3-2 to 3-4.

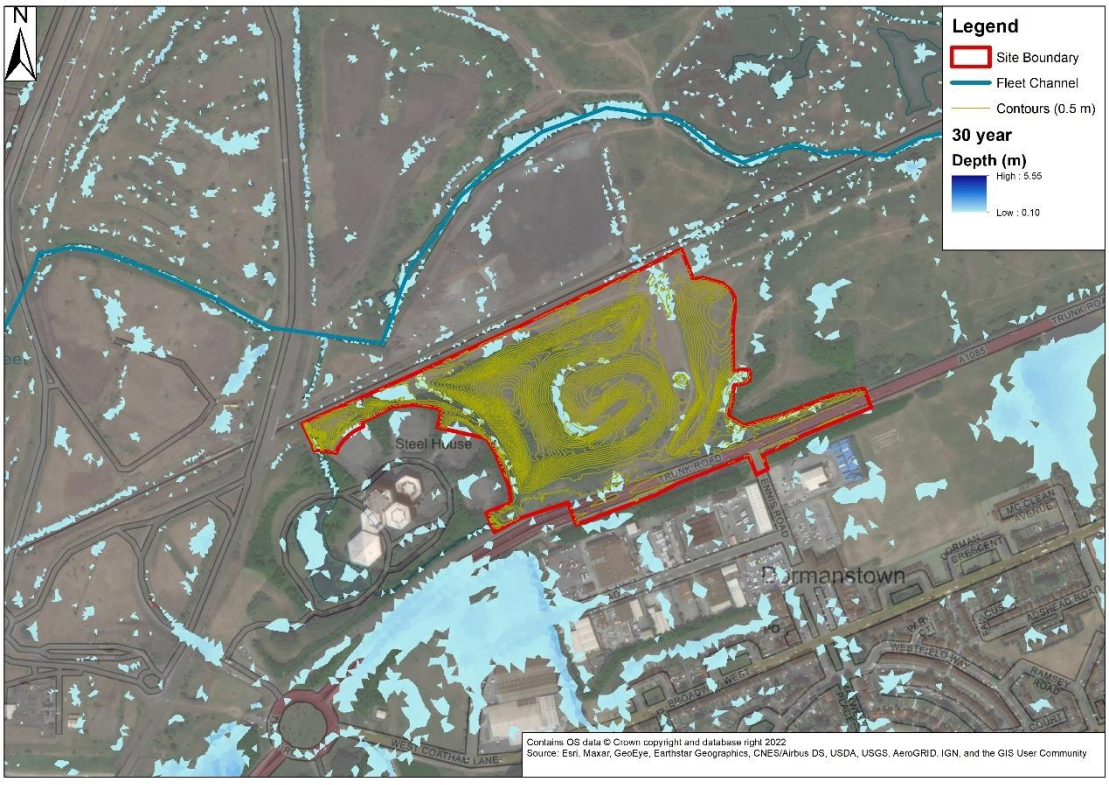

Figure 3-2: Surface Water Flood Mapping 1 in 30 year

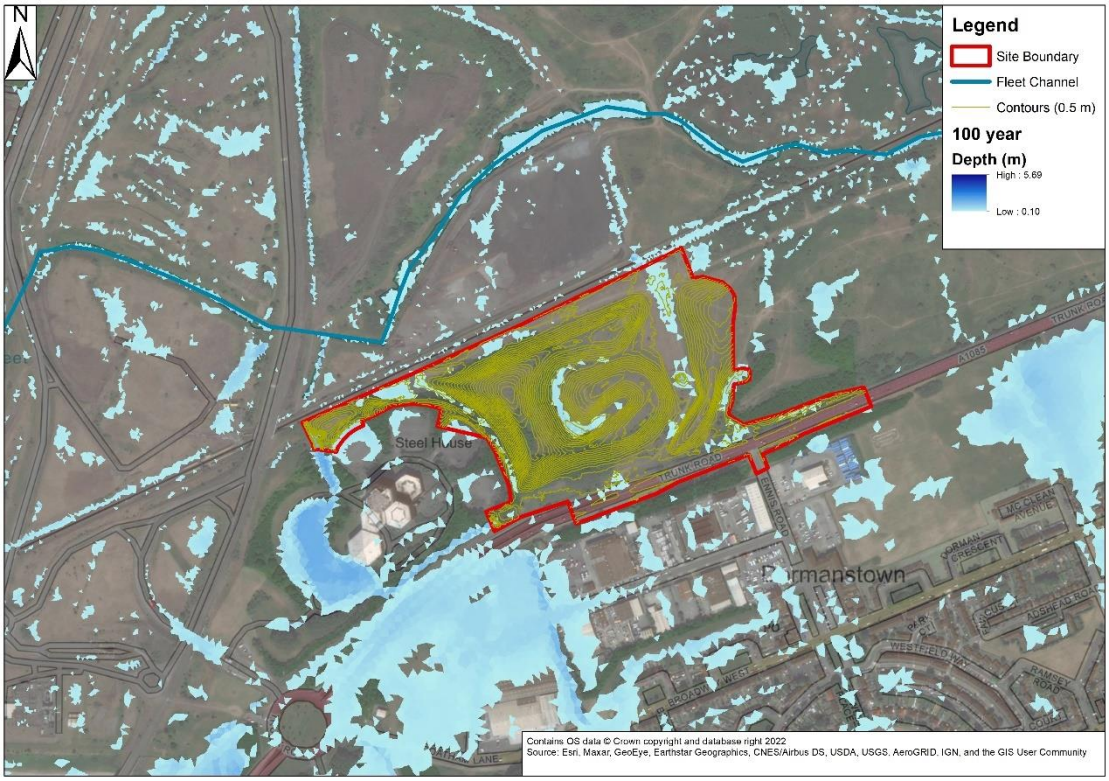

Figure 3-3 : Surface Water Flood Mapping 1 in 100 year

Figure 3-4: Surface Water Flood Mapping 1 in 1000 year

The pluvial flood maps show similar surface water ponding within the site as indicated by the EA maps. The surface water maps indicate that surface water ponding would be present on site for a 30 year event, which is not shown on the EA flood maps and would be in line with high risk or Flood Zone 3. However, the surface water modelling shows no flowpath entering the site from outside the boundary and the surface ponding can be considered the result of rainfall falling on low lying areas of the site and being unable to escape. Therefore, it is considered that any surface water flood risk can be managed through the implementation of a suitable surface water management plan.

3.5.3 Climate Change

The NPPF states that a "proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk" should be adopted. With respect to pluvial flood risk, Environment Agency recommended allowances[3] for 1 in 100 year event are shown in Table 3-1.

At the time the surface water modelling was undertaken, the recommended allowances where 20% and 40% for rainfall. The model has not been updated for the new allowances however the previous allowances have run in the model and can be used as an indicative tool as to how surface water flood risk is likely to increase as a result of climate change. The 40% allowances flood maps are shown in Figures 3-5 to 3-7.

The impact of climate change can be summarised as a general increase in flood depth however, not a dramatic increase in flood extent nor a change to flooding mechanisms. The 40% allowance for climate indicates that any surface water flood risk to the site is a result of rainfall in the site that cannot escape. This can be mitigated through the implementation of a suitable surface water management plan. Any proposed surface water management plan should take into account the revised climate change allowances as shown in Table 3-1.

The 1 in 100 year + 40% climate change maps indicate that the Trunk Road will flood to the south of the site however access and egress to the site can be maintained during this event with the Trunk Road remaining free of inundation to the north.

Table 3-1: EA Climate Change allowances for rainfall, Tees Management Catchment

Epoch	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

3 https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall

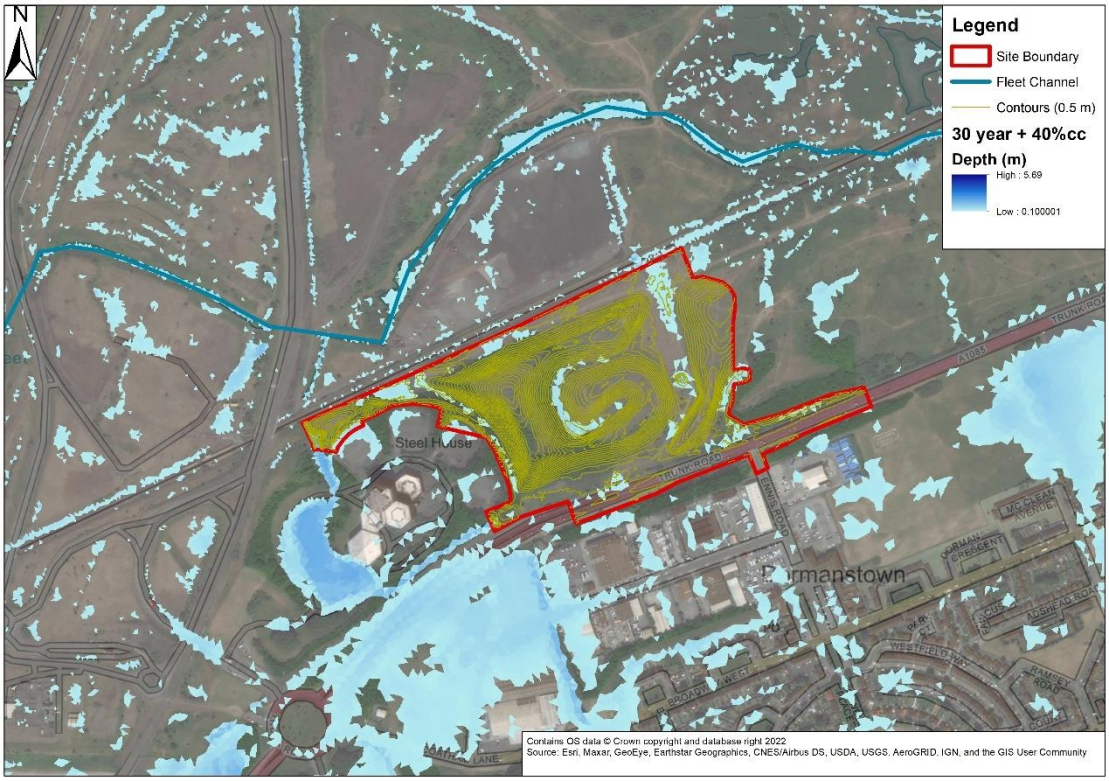

Figure 3-5: Surface Water Flood Mapping 1 in 30 year + 40% Climate Change

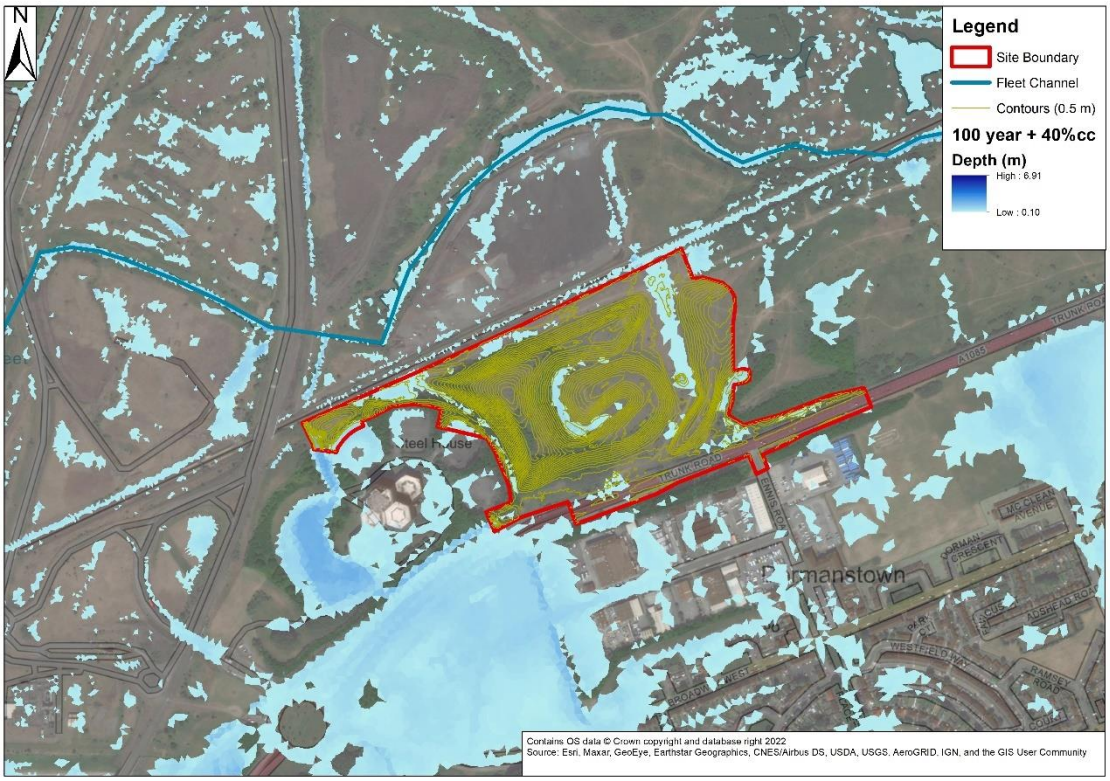

Figure 3-6: Surface Water Flood Mapping 1 in 100 year + 40% Climate Change

Figure 3-7: Surface Water Flood Mapping 1 in 1000 year + 40% Climate Change

3.6 Sewers Culverts and Bridges

The Ash Gill Beck flows under the Trunk Road via a culvert which then flows towards the Ash Gill Beck. The Ash Gill Beck then flows over a fixed water level control weir located to the north of Steel House before exiting the site to the north to join with the Fleet via a culvert under the railway line.

Surface water modelling, the EA maps and historic records indicate that this section of the Ash Gill Beck has limited capacity to convey flow and can lead to floodings of the Steel House Site and the A1080 Trunk Road. However, flood risk is unlikely to affect the Park and Ride facility.

3.7 Ground Water Flooding

Groundwater flooding is flooding that is caused by unusually high groundwater levels or flow rates. During flooding, groundwater can emerge at the ground surface or within man-made underground structures such as basements. There are various mechanisms of groundwater flooding, including clearwater flooding due to prolonged heavy rainfall on distant connected aquifers, alluvial and coastal groundwater flooding and that associated with minewater rebound or ground subsidence.

The EA alongside the BGS have developed a groundwater vulnerability map[4] accessed through the DEFRA MAGiC Map Portal. This designates the site as in an area of medium-high risk from groundwater. These risks are described on the BGS as:

4 BGS Groundwater vulnerability data. https://www.bgs.ac.uk/datasets/groundwater-vulnerability-data/ Assessed September 2022.

- High: areas able to easily transmit pollution to groundwater, characterised by high-leaching soils and the absence of low permeability superficial deposits.
- Medium: areas that offer some groundwater protection. Intermediate between high and low vulnerability

Groundwater flooding is typically not a direct cause of flood risk, being a secondary factor that can prolong and increase the severity of a given flood event. Given the mechanisms for flooding with the site boundary being the result of direct rainfall that can be managed by a surface water management system, risk from ground water is considered low.

3.8 Reservoir Flooding

The risk of flooding from reservoirs is related to the breach of a large reservoir (a large reservoir is classified as a reservoir which can hold over 10,000 m^3 of water) and is based on the worst case scenario.

The Environment Agency flood maps indicate that the site is not encroached by reservoir inundation extents. The Fleet Channel is mapped as being with the extents, emanating from two reservoirs which lie to the south east of the site Brine Reservoir, Wilton No.1 and Brine Reservoir, Wilton No.2.

Risk from this source to the site is considered low.

4 Proposed Drainage Strategy

A "Drainage Options Statement" had been developed for the development by Atkins that set out proposals for draining the site in a manner that will, at minimum, have a neutral impact on flood risk to others outwith the site. However, revisions to the site layout require the drainage strategy to be updated.

The objectives of this report is to assess the pre-development runoff from the site and consider the management of surface water runoff from the site and associated attenuation requirements.

The basis of any drainage strategy is to determine where runoff will be discharged, how the peak flow rate and volume will be managed, how urban runoff will be treated before being discharged into the natural environment and the long-term function of the drainage network.

4.1 Pre-Development Runoff Rates

An estimate of pre-development "greenfield" runoff rates has been undertaken using the IH124 methodology to understand the base case for site runoff.

The IH124 methodology is an extension of the Flood Studies Report (FSR) work and was developed for assessing runoff from small rural catchments. The inputs required are the site area, Standard Average Annual Rainfall (SAAR) and a runoff coefficient derived from the predominant soil type.

The site area is approximately 14.14 ha. The SAAR was taken from the FEH13 catchment descriptors obtained through the FEH Web Service[6] and was 633 mm. The predominant soil type, derived from FSR Maps was measured to be 0.45. With these inputs Q_{BAR} was estimated to be 0.055 m^3/s or 55 l/s using the equation below.

$$Q_{BAR} = 0.00108 \times Area^{0.089} \times SAAR^{1.17} \times SOIL^{2.17}$$

Table 4-1 shows the likely runoff rates for a range of return periods. The Atkins report states that discussions with Redcar and Cleveland Lead Local Flood Authority (LLFA) have been held to confirm that post development discharge from the site should be restricted to the greenfield runoff rates. It is proposed to restrict pre-development flow to the 1 in 1 year runoff rate of 47.02 l/s.

6 https://fehweb.ceh.ac.uk/

Table 4-1 Pre-Development Runoff Rates

Return Period (Years)	Runoff (l/s)	Specific Runoff (l/s/ha)
1	47.02	3.36
2	51.34	3.67
5	68.07	4.86
10	79.17	5.65
30	95.90	6.85
50	103.55	7.40
75	109.57	7.83
100	113.83	8.13
200	124.11	8.86

4.2 Surface Water Drainage

Current best practice identifies four destinations for the disposal of surface water in order of preference:

1. Infiltration into the ground
2. A waterbody
3. A surface water sewer
4. The combined sewer system

The Atkins report states that discussions with the Redcar and Cleveland LLFA indicated that the ground water table was approximately 1.6 – 2m below ground level, relatively high, and therefore infiltration to ground would likely be an unsuitable means of discharging post development surface water runoff.

The Ash Gill Beck channel to the west of the site is therefore the preferred discharge point for the site, being the closest waterbody. However, it is noted that this is a current source of flood risk to the Trunk Road and the Steel House Site. The Atkins report states that discussions with the LLFA that the watercourse is significantly silted and that the LLFA will undertake remediation works to improve the situation. The site sits within the Fleet catchment and it is considered that surface water from the site currently contributes to the Ash Gill Beck and the Fleet. The proposed drainage strategy outlined below will likely reduce the impact of runoff from the site during extreme flood events and results in betterment.

Should it be impractical to discharge to the watercourse, an alternative could be to discharge to existing surface water sewerage however, this requires further investigation to understand the condition, size, depth and true location of the infrastructure.

It is proposed to limit all post development surface water discharge to a total of 47.02 l/s. This will result of surface water being retained on site during extreme rainfall events. An estimation of the storage required to accommodate attenuated surface water has been undertaken. The estimated storage volume required has been assessed using WinDES Microdrainage's quick storage estimate tool. In line with EA climate change allowances, a 45% uplift has been applied. While the total site area is approximately 14.14 ha, 9.51 ha will be considered impermeable post-development. The results provide a bound of storage volumes to account for variables such as the dimensions of the storage and efficiency of the flow control adopted. The estimated required storage for the site is between 7,149 m^3 and 10,973 m^3

Detailed hydraulic calculations are required to ensure that the attenuated volumes can be contained on site without placing the site at unnecessary flood risk.

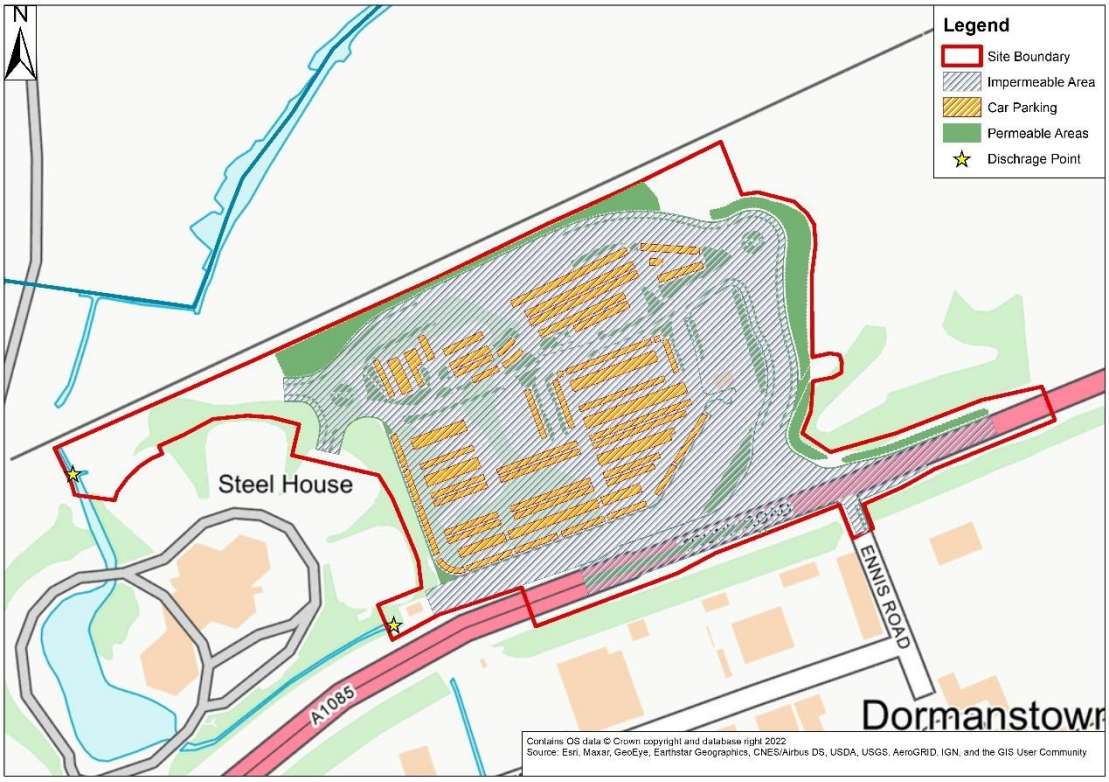

Figure 4-1: Drainage Areas

4.3 Surface Water Treatment

CIRIA's Simple Index Approach Tool (SIA Tool) can be used to assess appropriate treatment for new developments. This approach takes into account that SuDS vary in terms of their pollutant removal capacity, and land-users differ in terms of the risks of pollution they present.

The site is predominately car parking and falls under the classification "*non-residential car parking with frequent change*" within the SIA tool. The land use will generate pollution Hazard Indices of 0.7 for Suspended Solids, 0.6 for Metals and 0.7 for hydrocarbons. Permeable paving provides pollution mitigation indices of 0.7 for Suspended Solids, 0.6 for Metals and 0.7 for hydrocarbons, essentially like for like, and is considered sufficient.

The combined local authority "Tees Valley Design Guide & Specification" (TVDG) states that Oil Separators are required for

- Car parks larger than 800m^2 in area or 50 or more car parking spaces
- Smaller car parks discharging to a sensitive environment
- Areas where goods vehicles are parked or manoeuvred.

Whilst the permeable paving will provide suitable treatment for the car parking areas, as there is limited treatment options for the connecting roads and the remainder of the site, it is recommended that oil separators be used prior to discharge to the water environment.

5 Conclusions and Recommendations

It proposed to develop land within the Redcar Steel Works site in Teeside to the east of Steel House, British Steel's former Teeside headquarters. The proposed site is approximately 14.14 ha in area and is characterised as grassland, however, the site is unused brown field land where slag is the main component of the upper layer of ground.

Proposals for the site are to provide a Park and Ride facility and new access from the A1085 Trunk Road. The proposed use of the site is considered to be "Less Vulnerable" as categorised in the NPPF Annex 3.

The site has been assessed against flood risk from all sources. The EA flood maps indicated that the site is within Flood Zone 1 from Rivers and Seas and flood risk from these sources is considered low.

An assessment of the impact of climate change on extreme sea levels indicates that for a 1 in 200 year event extreme sea levels could reach 5.02 mAOD when considered at a higher central percentile or 5.40 mAOD when considering a upper end percentile. It would be recommended that, where possible, site levels should be set above the 5.40 mAOD level.

The EA flood maps indicate a medium to low risk of surface water ponding on site. Assessment of these maps indicate no overland flow path from outside the boundary flowing through the site.

Additionally, JBA Consulting undertook surface water modelling of the Teeswork area to inform the Water Management Strategy for the greater STDC development. These maps corroborate the EA Maps.

Surface water ponding on site is likely the result of rainfall on the site being contained within localised topographical depressions. This risk can be managed post development through the implementation of a suitable surface water management plan.

A high level drainage strategy for the site has been developed. Consultation with the Redcar and Cleveland LLFA indicate a relatively high ground water table and it is therefore considered that infiltration to ground is not practicable. It is therefore proposed to discharge surface water to the Ash Gill Beck, that then discharges to the Fleet.

An assessment of predevelopment runoff rates has been undertaken and, following discussions with Redcar and Cleveland LLFA, it is proposed to limit all post development discharge to the 1 in 1 year pre-development runoff rate of 47.07 l/s.

Attenuating surface water discharge will result in the requirement to store surface water on site during extreme rainfall events. An assessment for the total site storage required has been undertaken and estimated to be between 7,149 m^3 and 10,973 m^3.

It is recommended that detailed hydraulic calculations are undertaken to ensure that the attenuated volumes can be contained on site without placing the site at unnecessary flood risk

Potential solutions for the remainder of the site include combined drainage kerbs/gullies with oversized pipes. Detailed assessment of proposed drainage options should be undertaken during detailed design.

The proposed permeable paving will provide suitable surface water treatment for surface water runoff from the car park areas. The Tees Valley Design Guide & Specification states that Oil Separators are required for car parks larger than 800m^2 or 50 or more car parking spaces. The combination of the permeable paving and oil interceptors would be considered sufficient.

It is considered that flood risk to the site is low and that the site can be developed to provide, at minimum, a neutral impact on flood risk to others.

Appendices

A Proposed Development

DO NOT SCALE

Millimetres 0 10 100

TEESWORKS

REDCAR BRITISH STEEL (RBS)

STEEL HOUSE

STEEL HOUSE GATE (TEESWORKS)

PUMP HOUSE

WATER METER HOUSE

TOD POINT ROAD

WARRENBY

MIDDLESBROUGH TO SALTBURN RAIL LINE

A1085 TRUNK ROAD

< MIDDLESBROUGH

REDCAR >

ENNIS ROAD

LIMERICK ROAD

DORMANSTOWN IND. ESTATE

MO MOWLEM MEMORIAL PARK

WEST COATHAM LANE

BROADWAY WEST

BROADWAY EAST

DORMANSTOWN

WILTON WORKS

E = 457950
N = 524300

457000 457500 458000 458500 524000 524500 525000 523500

Scale 1:2500
50m 0m 50m 100m 150m

NOTES:

1. THE SITE EXTENTS (PLANNING APPLICATION BOUNDARY) ARE SHOWN FOR CONSTRUCTION WORKS ONLY AND DO NOT INCLUDE FOR TEMPORARY TRAFFIC MANAGEMENT, DIVERSION ROUTES, UTILITY DIVERSIONS OR SITE CONSTRUCTION AREAS WHICH MAY EXTEND BEYOND THE RED LINE BOUNDARY SHOWN.
2. PROPOSED PARK AND RIDE (APPROX.) CENTRE LOCATED AT ORDNANCE SURVEY GRID COORDINATES;
   N: 457950, E: 524300 (NZ 57 24)

KEY:

BOUNDARIES:

- STDC LAND OWNERSHIP BOUNDARY
- PLANNING APPLICATION BOUNDARY

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description: UPDATED FOR OPTION 7 (ISSUED TO TEAM & EXTERNAL)

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S2	P01	MT	DS	MT	---	09/08/22

Description: ISSUED FOR PLANNING

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
A2	C01	MT	MT	MT	DMA	02/09/22

Drawing Suitability: APPROVED - ORDERS / LICENSES — Status: A2

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Client: TEESWORKS — The UK's largest industrial zone

Project Title: SOUTH TEES DEVELOPMENT CORPORATION

Drawing Title: STEEL HOUSE PARK & RIDE PLANNING APPLICATION SITE LOCATION

Drawing Number

Project	Originator	Volume	Location	Type	Role	Number
STDC_HWY -	ATK -	LDC -	SHPR	- DR -	CH -	000001

Original Size:	Scale:	Project Ref. No:	Sheet:	Rev:
A1	1:2500	5198022	1 of 1	C01

DO NOT SCALE

Millimetres 0 10 100

EXISTING STEEL HOUSE CAR PARK DRAINAGE OUTFALL LOCATION. WORKS TO BE DETERMINED FOR CONNECTION OR RENEWAL OF OUTFALL INTO EXISTING WATERCOURSE.

P&R DRAINAGE OUTFALL; TYPE, SIZE & ALIGNMENT TO BE DETERMINED DURING DETAILED DESIGN.

ZONE 1A & 1B:
30 No. 3.6m x 6.0m DISABLED SPACES
79 No. 2.4m x 4.8m CAR SPACES
14 No. STAFF PARKING SPACES

CROSSING POINT WITH RAISED SPEED TABLE

SECURITY OFFICE & INDUCTION BUILDING

BUS STATION AMENITY BUILDING

P&R PUBLIC PICK UP / DROP OFF

8 No. CYCLE SHELTERS
(80 CYCLE SPACES)

6 No. P&R BUS PICK UP / DROP OFF POINTS WITH BUS SHELTERS

BUS SHELTERS

P&R PUBLIC BUS STOP

ZONE 2A 2B:
150 No. 3.6m x 6.0m E.V. CHARGING SPACES
30 No. 1.5m x 3.0m MOTORCYCLE SPACES

4 No. P&R TEMPORARY HOLDING BUS SPACES IN DEDICATED ACCESS ROAD

MIDDLESBROUGH TO SALTBURN RAIL LINE

THE FLEET

LOCKABLE BARRIERS

AUTOMATED SECURITY BARRIER FOR CONTROLLED ACCESS TO CAR PARKS

NEW EARTHWORKS CUTTING TO TIE-INTO EXISTING BUND

PARK & RIDE INTERNAL SPINE ROAD

AUTOMATED SECURITY BARRIER FOR CONTROLLED ACCESS TO CAR PARKS

PARK & RIDE PRIMARY ENTRY POINT

EXISTING UTILITY ZONE (WATER, ELECTRIC, BT, BREAGH PIPELINE)

MAIN ACCESS ROAD

LANDSCAPE GAP FOR "TEESDALE WAY"

4.0m SEGREGATED CYCLEWAY / FOOTWAY

2-LANE EXIT REQUIRED FOR PEAK FLOWS

EXISTING TRUNK ROAD WIDENED TO ALLOW NEW RIGHT TURN LANE AND CENTRAL RESERVE

ENNIS ROAD REMAINS LEFT IN / LEFT OUT WITH NEW SLIP LANE EXIT. WORKS TO JUNCTION TO BE DETERMINED THROUGH CONSULTATION WITH RCBC

PROPOSED ALL MOVEMENTS TRAFFIC SIGNAL CONTROLLED JUNCTION WITH SINGLE A1085 PEDESTRIAN CROSSING

EXISTING CARRIAGEWAY (HATCHED) CONVERTED TO NEW GRASS' CENTRAL RESERVE EXTENDED TO NEW JUNCTION

PROPOSED SEGREGATED CYCLEWAY / FOOTWAY TIES INTO EXISTING ROUTE

FUTURE LINK TO STEEL HOUSE

LOCKABLE BARRIERS

MAIN CAR PARK TWO LANE EXIT

ZONE 3A & 3B:
1175 No. 2.4m x 4.8m CAR SPACES

ZONE 4:
45 No. 3.5m x 7.5m MINI BUS / VAN SPACES

P&R DRAINAGE OUTFALL; TYPE, SIZE & ALIGNMENT TO BE DETERMINED DURING DETAILED DESIGN.

STEEL HOUSE

DORMANSTOWN IND. ESTATE

A1085 TRUNK ROAD

ACCESS ROAD

WILEY BECK

WILEY BRIDGE

PUMP HOUSE

LAKE

CAR PARK 1

CAR PARK 2

CAR PARK 3

CAR PARK 4

P&R LIMIT

RBT No.1

RBT No.2

ZONE 1A

ZONE 1B

ZONE 2A

ZONE 2B

ZONE 3A

ZONE 3B

ZONE 4

WATER METER HOUSE

FAIRWAY HOUSE & CENTRAL DEPOT

ARRIVA BUS DEPOT

ENNIS ROAD

LIMERICK ROAD

457500

458000

524000

524500

KEY:

ITEMS SHOWN ARE INDICATIVE FOR PLANNING STAGE AND ARE SUBJECT TO FURTHER REFINEMENT DURING DETAILED DESIGN.

- STDC LAND OWNERSHIP BOUNDARY
- PLANNING BOUNDARY
- EXISTING HIGHWAYS TO BE RESURFACED (TBC)
- PROPOSED HIGHWAYS
- CAR PARKING
- HARDENED HIGHWAY VERGE
- FOOTWAY AND / OR CYCLEWAY
- HIGHWAY VERGE
- VEGETATION & LANDSCAPING
- DRAINAGE ROUTE TO EXISTING WATERCOURSE
- BOUNDARY FENCE - METAL V-MESH
- BOUNDARY FENCE - TIMBER POST & RAIL
- BOUNDARY FENCE - TIMBER BIRDSMOUTH
- GATES & BOLLARDS (TIMBER / METAL TO SUIT)
- PEDESTRIAN CROSSING POINTS
- ELECTRIC VEHICLE CHARGING PARKING SPACE
- DISABLED PARKING SPACE
- BUILDINGS (inc. BUS SHELTER / CYCLE SHELTER)
- EXISTING UTILITY ZONE
- TEESDALE WAY

Scale 1:1250
10m 0m 10m 30m 50m 70m 90m

NOTES:

1. HIGH LEVEL PLANNING LAYOUT. A FULL GEOMETRIC DESIGN IS TO BE UNDERTAKEN ONCE FINAL PARAMETERS AND CONSTRAINTS ARE CONFIRMED.
2. PROPOSED PARK & RIDE LAYOUT CAR PARK PROVIDES:
   - 1,254 No. 2.4m x 4.8m CAR PARK SPACES
   - 30 No. 1.5 x 3.0m MOTORCYCLE SPACES
   - 45 No. 3.5m x 7.5m MINI BUS / VAN SPACES
   - 30 No. 3.6m x 6.0m DISABLED SPACES
   - 150 No. 3.6m x 6.0m E.V. CHARGING SPACES [1509 P&R SPACES]
   - 80 No. CYCLE SPACES IN 8 No. SHELTERS
   - 14 No. STAFF CAR PARK SPACES
3. FOR TYPICAL HIGHWAY CROSS SECTIONS REFER TO DRAWINGS: STDC_HWY-ATK-LDC-SHPR-DR-CH-000031 & 032.
4. SECURITY ARRANGEMENTS FOR THE SITE, INCLUDING ENTRY BARRIERS, GATES AND INTERNAL & EXTERNAL BOUNDARY FENCING ARE TO BE DETERMINED DURING DETAILED DESIGN.
5. KERBING - TYPES AND TACTILE PAVING ARRANGEMENTS TO BE DETERMINED IN ACCORDANCE WITH TEES VALLEY DESIGN GUIDE (TVDG) AND RELEVANT STANDARDS.
6. TRAFFIC SIGNS AND ROAD MARKINGS - ROAD MARKINGS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. AN APPROPRIATE TRAFFIC SIGNING AND ROAD MARKING LAYOUT WILL BE DEVELOPED DURING THE DETAILED DESIGN TO COMPLY WITH CURRENT STANDARDS (TSRGD 2016 & TVDG) AND BEST PRACTICE. THE SIGNING PROVIDED WILL INCLUDE APPROPRIATE DIRECTIONAL, INFORMATION, WARNING AND REGULATION SIGNS AS WELL AS ANY REQUIRED NMU SIGNS.
7. STREET LIGHTING - ALL SECTIONS OF NEW OR WIDENED HIGHWAY AND OFF CARRIAGEWAY NMU ROUTES WILL BE LIT IN ACCORDANCE WITH THE RELEVANT STANDARDS FOR THE ROUTE UNDER CONSIDERATION. THE DETAILED DESIGN WILL CONSIDER THE EXTENTS OF STREET LIGHTING REQUIRED TO PROVIDE SAFE HIGHWAY AND NMU ROUTES.
8. DRAINAGE - THE TWO DISCHARGE POINTS IDENTIFIED ARE SUBJECT TO REFINEMENT AT DESIGN STAGE. THE EXISTING DRAINAGE NETWORK SHALL BE ASSESSED TO DETERMINE EXISTING CAPACITY FOR JUNCTION WIDENING WORKS.
9. SEE JBA DRAWINGS FOR DETAILS IN RELATION TO FLOOD RISK ASSESSMENTS AND EXISTING WATERCOURSE DETAILS.
10. PAVEMENT DESIGN - THE ROAD CONSTRUCTION AND FOOTWAY / CYCLEWAY CONSTRUCTION WILL BE CONSTRUCTED FROM FLEXIBLE (BITUMINOUS) SURFACING MATERIALS (WHICH MAY INCLUDE PERMEABLE PAVEMENT OPTIONS FOR CAR PARK BAYS). PAVEMENTS WILL BE DESIGNED TO THE CURRENT TVDG STANDARDS OR UK DMRB PAVEMENT STANDARDS. EXISTING PAVEMENT CONDITION TO BE ASSESSED FOR AREAS OF RESURFACING OR FULL RE-CONSTRUCTION.
11. EARTHWORKS - THE GENERAL ARRANGEMENT DRAWINGS DO NOT SHOW HIGHWAY ALIGNMENT EARTHWORKS. THESE ARE TO BE DETERMINED DURING DETAILED DESIGN AND SUBJECT TO SITE REMEDIATION GROUND LEVELS..

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date

Description
UPDATED FOR OPTION 7 (ISSUED TO TEAM & EXTERNAL)

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
S2	P01	MT	DS	MT	---	09/08/22

Description
ISSUED FOR PLANNING

Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
A2	C01	MT	MT	MT	DMA	02/09/22

Drawing Suitability: APPROVED - ORDERS / LICENSES
Status: A2

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Project Title: SOUTH TEES DEVELOPMENT CORPORATION

Drawing Title: STEEL HOUSE PARK & RIDE PLANNING APPLICATION ENGINEERING LAYOUT (COLOUR)

Drawing Number
Project | Originator | Volume
STDC_HWY - ATK - LDC - SHPR - DR - CH - 000030
Location | Type | Role | Number

Original Size:	Scale:	Project Ref. No:	Sheet:	Rev:
A1	1:1250	5198022	1 of 1	C01

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