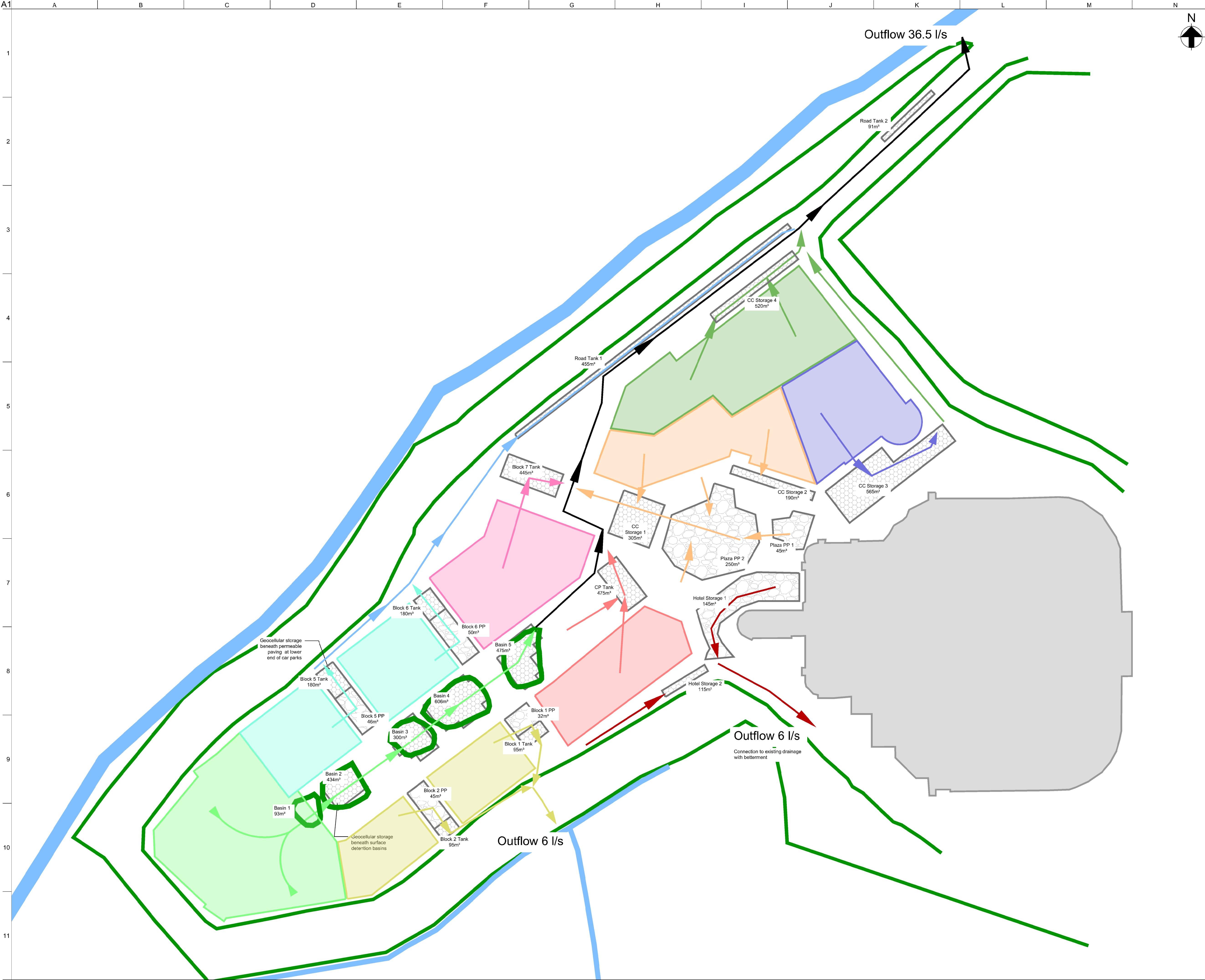


Legend

- Gravity Sewer
- Geocellular attenuation tank
- Permeable paving & SuDS aggregate
- Multi Storey Car Park
- Residential Blocks 1 & 2
- Residential Blocks 3 & 4
- Residential Blocks 5 & 6
- Residential Block 7
- Convention Centre 1
- Convention Centre 2
- Convention Centre 3

P01	11/01/16	JW	TM	DK
Issue for Planning Application				
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Client

Job Title
Royal Elm Park
(Land at Madejski Stadium)

Drawing Title
Surface Water
Schematic Overview

Scale at A1
1:1000

Discipline
Civil

Drawing Status
For Planning Application

Job No	Drawing No	Issue
240524-00	CD-00200	P01

Table 8 - Phase 2 storage volumes and pumping rates

Residential Block	24 Hour Storage Volume (m ³)	Pumped flow rate (l/s)
1	43	2.8
2	42	2.7
3	44	2.7
4	65	3.8
5	64	3.9
6	65	3.9

7 Utility Coordination

A fully coordinated utility strategy that incorporates the drainage has not been undertaken at this stage of design. Some consideration of the need for utilities in trenches has been considered in the drainage layout. Space has been left in close proximity to the structures on the site and adequate routes between drainage features have been incorporated.

8 Operation and Maintenance Considerations

Operation and maintenance has been considered in the development of this drainage design. There is a particular need when approaching maintenance for SuDS features.

Extended storage detention basins within the park area of the development will require regular maintenance as part of the gardening scheme for the development in the form of grass cutting.

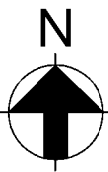
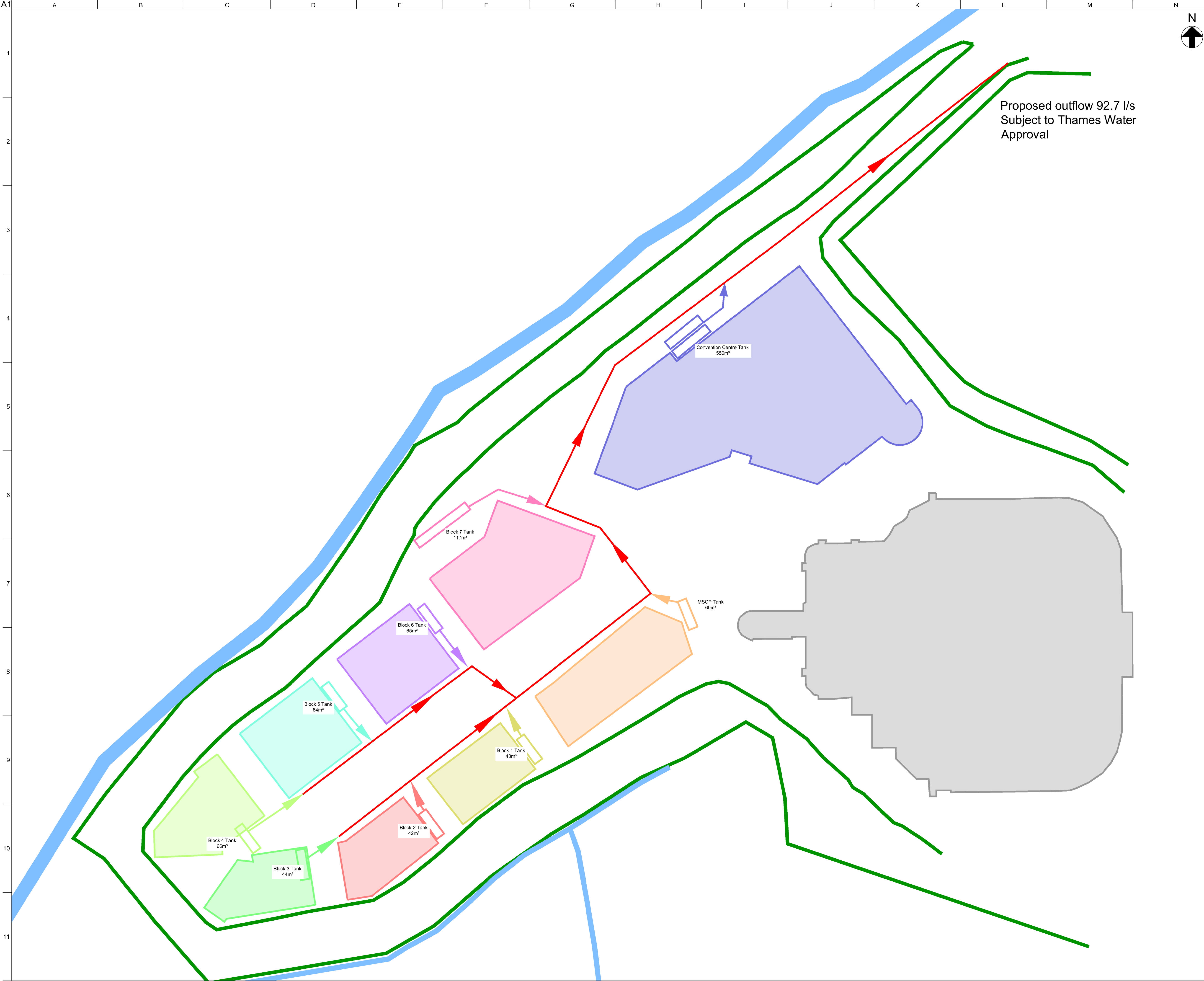
8.1 Settlement Strategies

Several measures are proposed to manage the settlement that is anticipated on this site.

Preliminary assessments of differential settlement due to a large void opening up within the fill have suggested a displacement of up to 120mm over a 12m span i.e. 1%. Additionally, the average tilt due to differential settlement could reach 1 in 12. As this scenario would likely require remedial works for accessibility and visual impact, it is deemed impractical to design the drainage features to be resilient to such large scale settlement. Therefore the drainage has been designed to be resilient to the first scenario and where larger settlements are occur it is recommended that the drainage systems are inspected and replaced as necessary.

8.1.1 Drainage resilience

- Incorporating rocker joints at the interfaces between buildings/manholes and pipes will allow for some movement of the ground to occur without compromising the pipe.



- Legend
- Gravity Sewer

Pumped storage

Multi Storey Car Park

Residential Block 1

Residential Block 2

Residential Block 3

Residential Block 4

Residential Block 5

Residential Block 6

Residential Block 7

Convention Centre

P01	11/01/16	JW	TM	DK
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Client

Job Title
Royal Elm Park
(Land at Madejski Stadium)

Drawing Title
Foul Water
Schematic Overview

Scale at A1
1:1000

Discipline
Civil

Drawing Status
For Planning Application

Job No	Drawing No	Issue
240524-00	CD-00201	P01



Notes

- This drawing is to be read in conjunction with the manhole schedules
240524-ARP-XX-XX-DR-CD-00102 & 00103 and standard details
240524-ARP-XX-XX-DR-CD-00105 & 00106.
- Existing sewers are shown based on available survey and record drawings. Although every effort has been taken to check survey/site information used on this drawing, Arup is not responsible for its accuracy.
- Existing sewer depths are not known at the time of this drawing being made. Prior to detailed design a utilities survey, including a CCTV survey of the existing drainage condition, shall be procured to verify the levels and positions of existing drainage and underground services.
- The minimum pipe size for below ground foul and surface water drainage shall be 150mmØ.
- Pipes less than 300mmØ are to be uPVC. Pipes 300mmØ and larger are to be HDPE.
- Drainage laid beneath roads and car parks with less than 1200mm of cover shall be encased in 150mm concrete with the provision for movement at joints. All other drainage with less than 900mm cover shall be similarly treated.
- It is assumed that where possible the foul and rain water downpipes will be routed through the basement level to the proposed points of connection. If it is determined during detailed design that the pipes cannot traverse these distances, additional manholes may be required outside the buildings. The quantity of manholes is subject to change due to coordination with underground services and other site elements during detailed design.
- Thames Water is currently conducting an Impact Study for the proposed foul water connection to the public sewer. Storage tanks have been provided for all buildings to accommodate 24 hours of storage in accordance with Buildings Regulations Approved Document H. The exact pumping rate from each building is to be determined based on the result of the Impact Study, however it is assumed at this time that the allowable discharge rate will require replacing the existing sewer with a 300mmØ sewer.
- All disused drains to be grouted up or removed.
- All gullies are shown indicatively. Exact location and means of collection, i.e. gullies vs channels, to be coordinated during detailed design. Runoff from roads shall pass through an appropriate means of hydrocarbon separation (permeable paving, Biomat, etc) prior to entering the below ground drainage system.
- Geocellular tank products shall have interlocking capability for high horizontal shear strength. Subgrade preparation shall be per manufacturer's requirements and shall incorporate Tensar geogrid for additional stability.
- Similar proprietary products may be submitted to Engineer for approval in lieu of those shown herein.

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Client

Reading Football Club

Job Title
Royal Elm Park
(Land at Madejski Stadium)

Drawing Title
Proposed Drainage Layout
for Outline Planning Application

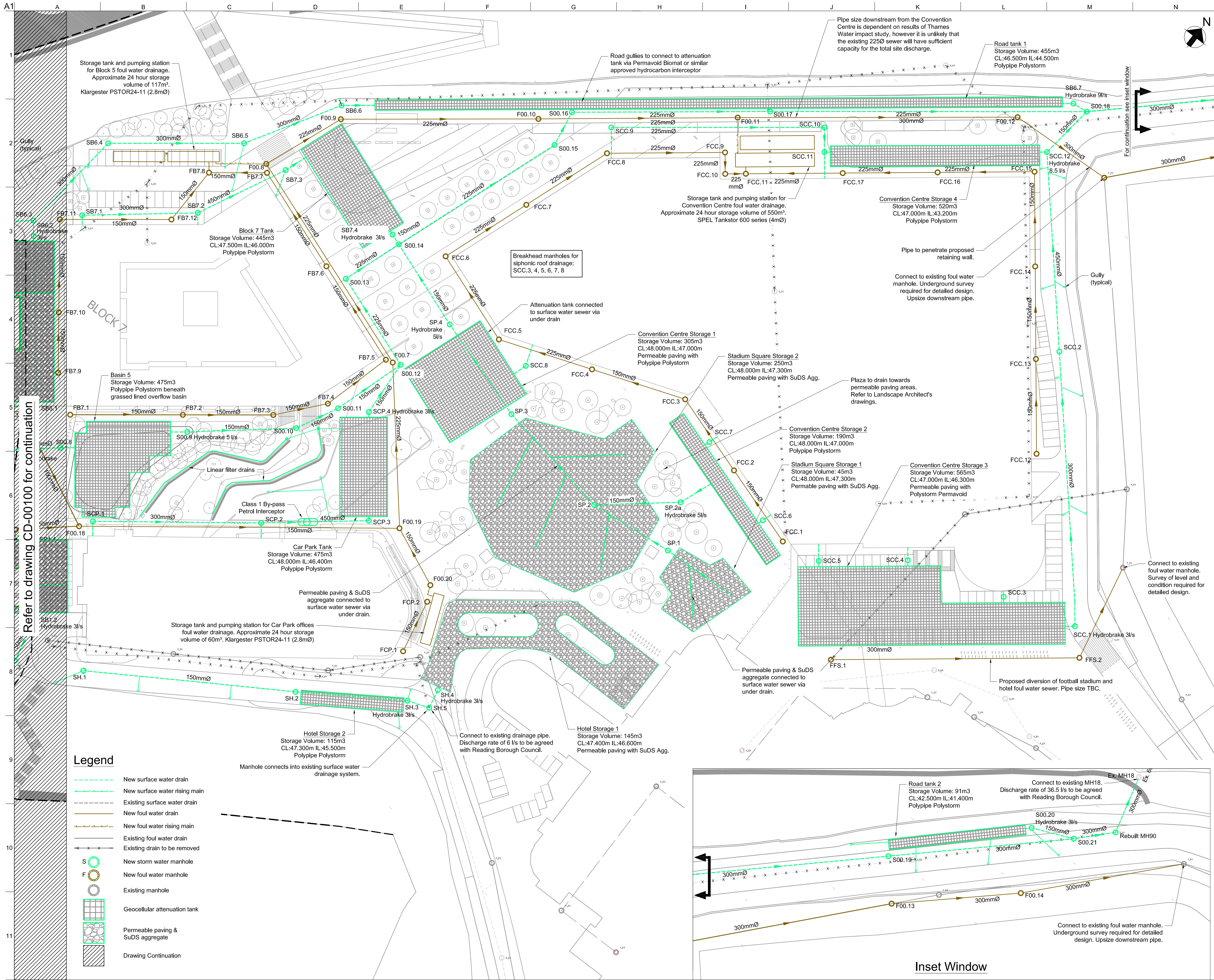
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Discipline Civil

Drawing Status

For Planning Application

Job No	Drawing No	Issue
240524-00	CD-00100	P01



- ### Notes
- This drawing is to be read in conjunction with the manhole schedules 240524-ARP-XX-XX-DR-CD-00102 & 00103 and standard details 240524-ARP-XX-XX-DR-CD-00105 & 00106.
 - Existing sewers are shown based on available survey and record drawings. Although every effort has been taken to check survey/site information used on this drawing, Arup is not responsible for its accuracy.
 - Existing sewer depths are not known at the time of this drawing being made. Prior to detailed design a utilities survey, including a CCTV survey of the existing drainage condition, shall be procured to verify the levels and positions of existing drainage and underground services.
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Reading Football Club

Job Title
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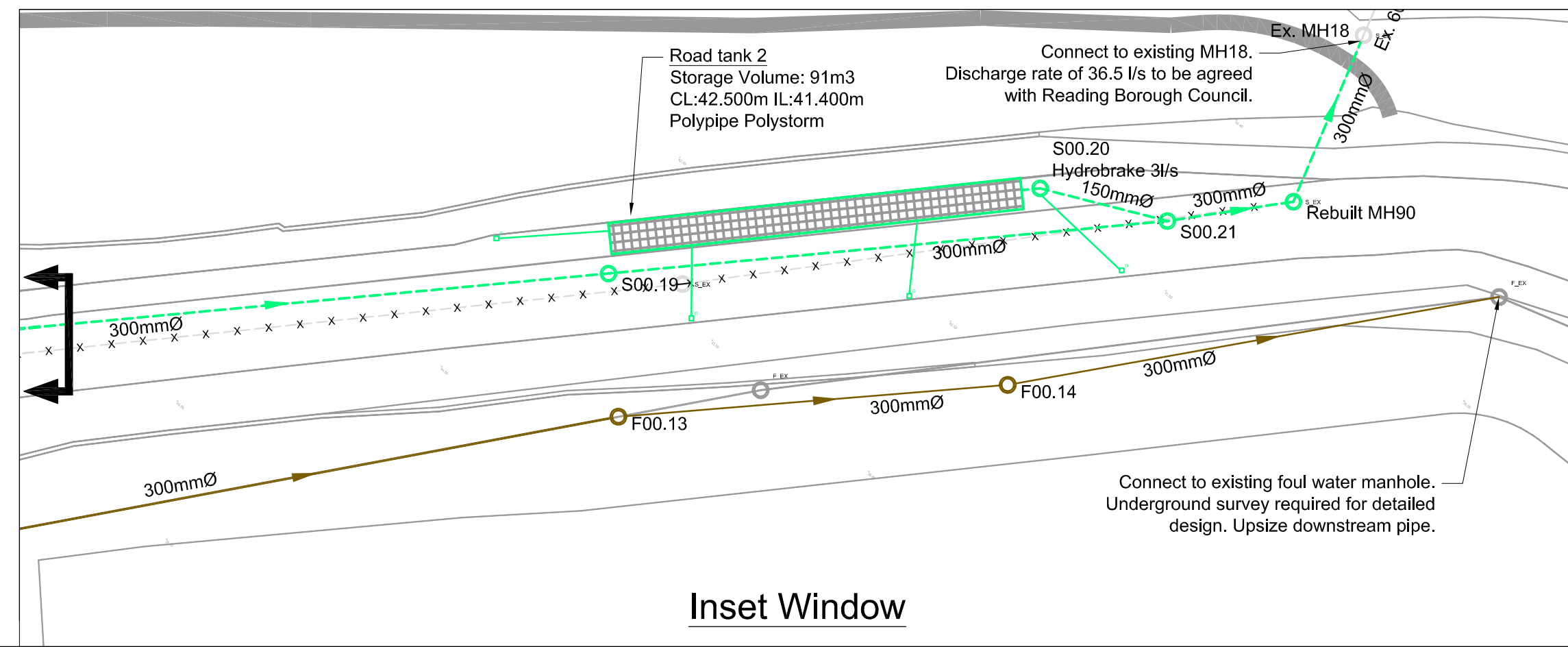
Drawing Title
**Proposed Drainage Layout
for Detailed Planning Application**

Scale at A1: 1:500

Discipline: Civil

Drawing Status
For Planning Application

Job No	Drawing No	Issue
240524-00	CD-00101	P01



Legend

- New surface water drain
- New surface water rising main
- Existing surface water drain
- New foul water drain
- New foul water rising main
- Existing foul water drain
- Existing drain to be removed
- New storm water manhole
- New foul water manhole
- Existing manhole
- Geocellular attenuation tank
- Permeable paving & SuDS aggregate
- Drawing Continuation



CampbellReith
consulting engineers

Appendix 4

Topographical Survey