Case Study: Chorlton High School

SuDS Audit – March 2016

Background

Chorlton High School (CHS), located in Chorlton south Manchester, which was originally for Boys was founded in September 1924. In 1952 it became a grammar school and during the 1960s it returned to being a comprehensive. It was designated a specialist Arts College in 2002. In May 2012, the school governors approved the decision to convert into an academy. The school became an academy on 1 January 2013.

As a result of becoming a Specialist Arts College back in 2002, the school received extra funding for a £17 million rebuild, which enabled the whole school to be together on one site for the first time in its history. Chorlton High School now boasts state-of-the-art facilities, used both by students and the local community, including specialist drama and music rooms, a 300 seater theatre, an all-weather pitch for sports and a gymnasium.

The school is one of the biggest in Manchester hosting nearly 1500 pupils.

Surface Water Charge Status

- The chargeable surface area is 30,785m2
- Charge Banding 10.

Prior to the SuDS audit the 'Business Support Manager, Facilities', provided a United Utilities Bill and the drainage plan for the site.

The drainage plan, see Appendix 1, revealed that all surface water runoff from the school is disposed into the Chortlon Brook which runs through the site forming a dividing line between the school buildings and the sports pitches. Consequently this meant that nothing could be done to reduce their water bills. However, it was agreed that a SuDS scoping audit would still be a valuable exercise if a hypothetical approach were taken, as the findings could be used as guidance / templates for other schools interested in carrying out an audit. In addition, owing to the willingness of the 'Business Support Manager, Facilities' to participate and the assemblage of skilled / technical officers / employees from partner organisations it was deemed a good opportunity for trialling the audit.

Site Audit Findings – see Appendix 2 for the location of potential SuDS

The site audit was attended by representatives from each of the 9 partner organisations.

Map Reference A – Seven freight storage containers on grass adjacent to asphalt sports pitch / artificial sports pitch. The freight containers could, subject to loading, host extensive green roof systems.

Figure 1 – Freight Containers

Map Reference B – Base of embankment adjacent to asphalt sports pitch. The pitch slopes towards the grass embankment and there is evidence from silt deposits that water drains to this point. A filter strip could be installed at the base of the embankment along its length to intercept the runoff that accumulates here. This would be subject to subsoil conditions.

Figure 2 – Silt Deposit from Run Off on Sports Pitch next to Grass Embankment

Map Reference C - Hard landscaped area after bridge in front of freight containers. There is a slight fall towards the freight containers. Surface water runoff could be shed into a bio- retention area / swale. Ground conditions would need to be established to determine whether rainwater will be able to infiltrate or moved onto the adjacent green space and then the Chorlton Brook.

Figure 3 – Asphalt Surface Adjacent to Freight Containers

Map Reference D - Grassed space between AstroTurf pitches and Chorlton Brook. Rainwater draining off the sports pitches could be conveyed into a detention basin where it can be stored and allowed to infiltrate (subject to the sub-soil conditions). In significant / prolonged rainfall events, water could be conveyed to the adjacent Chorlton Brook. To facilitate this SUDS intervention a level change would be required to get the rainwater from the drain into this space.

Figure 4 – Exit Drain for Sports Pitch Runoff

Figure 5 – Grass Field Adjacent to Astro Turf Pitch

Map Reference E - Clough / green space adjacent to Chorlton Brook. Divert water from playground into linear green space to create a wetland and plant additional vegetation to slow down runoff.

Map Reference F- Playground adjacent to sports hall & main building. The surface channel drains on the playground frequently back up despite cleaning. Soakaways could be installed to allow water to infiltrate in substrate - depending on subsoil type

Figure 6 / 7 – Playground areas adjacent to Main Building & Sports Hall

Map Reference G/H - Sports hall - Mauldeth Road elevation. Water draining off the Sports Hall roof via the downpipes could be diverted into downpipe planters.

Figure 8 – Back of Sports Hall with Downpipes Visible

Map Reference I/J - Main Building - Mauldeth Road elevation – plant room roof. There is a potential opportunity for an extensive green roof system. The roof is pitched so box partitions may be required to prevent soil migration - structural assessment would also be needed. In addition a downpipe planter could also be installed to take the water off the roof / green roof.

Figure 9 – Pitched Roof On Plant Room Back of Main Building

Map Reference J/K - Main Building – The roof over entrance hall from Mauldeth Road elevation contains flat sections either side of pitched roof light and so there may be scope for an extensive green roof system. A fall arrest system is already in place which would allow maintenance for a green roof to be undertaken. A structural assessment would be needed to determine loading capacity.

Map Reference L - Atrium adjacent to canteen in the main building. Remove flags and form raingarden - diverting water from downpipe(s) into the raingarden. Further investigation would be required to determine sub soil conditions for infiltration and any potential impact on building foundations.

Figure 10 – Atrium Next to Canteen

Map Reference M/N - Bin store and picnic table area. There is the potential to install two down pipe planters here to take water off this section of the main building roof. Some reconfiguring of the picnic tables would be required to provide sufficient space for the planters.

Figure 11 – Bin Store / Picnic Table Area

Map Reference O - Green triangle to left of main building entrance. Divert water from downpipe into existing greenspace to create a raingarden. Further investigation would be required to determine sub soil conditions for infiltration and any potential impact on building foundations.

Figure 12 – Green Space Left of Main Building Entrance, Bicycle Shed in the Background

Map Reference P - Bike shed. The bike shed could be adapted to host a simple extensive green roof system. Some strengthening may be required and lighting would be needed as otherwise the internal space would be too dark. Water could also be diverted off the bike shed roof into adjacent green triangle.

Map Reference Q - Entrance canopy roof. There is an opportunity for an extensive green roof system, subject to a structural assessment. The roof is accessible for maintenance operatives.

Figure 13 – Main Building Entrance Canopy

Map Reference R- Main roof - flat roof component. A significant extensive green roof system could be installed here subject to loading capability. The roof is accessible to maintenance operatives.

Map Reference S – The downpipe taking water off the roof could be diverted into a downpipe planter or series of planters which could create a significant entrance feature that would be visually accessible to all pupils and visitors to the school.

Map Reference T/U - End to end parking strips. Construct narrow filter drain between the opposing parking bays and lay to a fall to the greenspaces at each end of the parking area. The ability to infiltrate will be subject to subsoil conditions.

Map Reference V - linear green Island next to visitors car park. Install slot kerbs to allow water running off the car park / access road surface into green space to create a bio-retention area. A level change in the green space would be required to accept the rainwater.

Map Reference W - Green Room. On first visual assessment this appears to have a substantial roof that could support an extensive green roof system but structural assessment will still be required. There is also a parapet wall that appears to provide high enough protection for maintenance operatives

Figure 16 – Green Room and Car Park

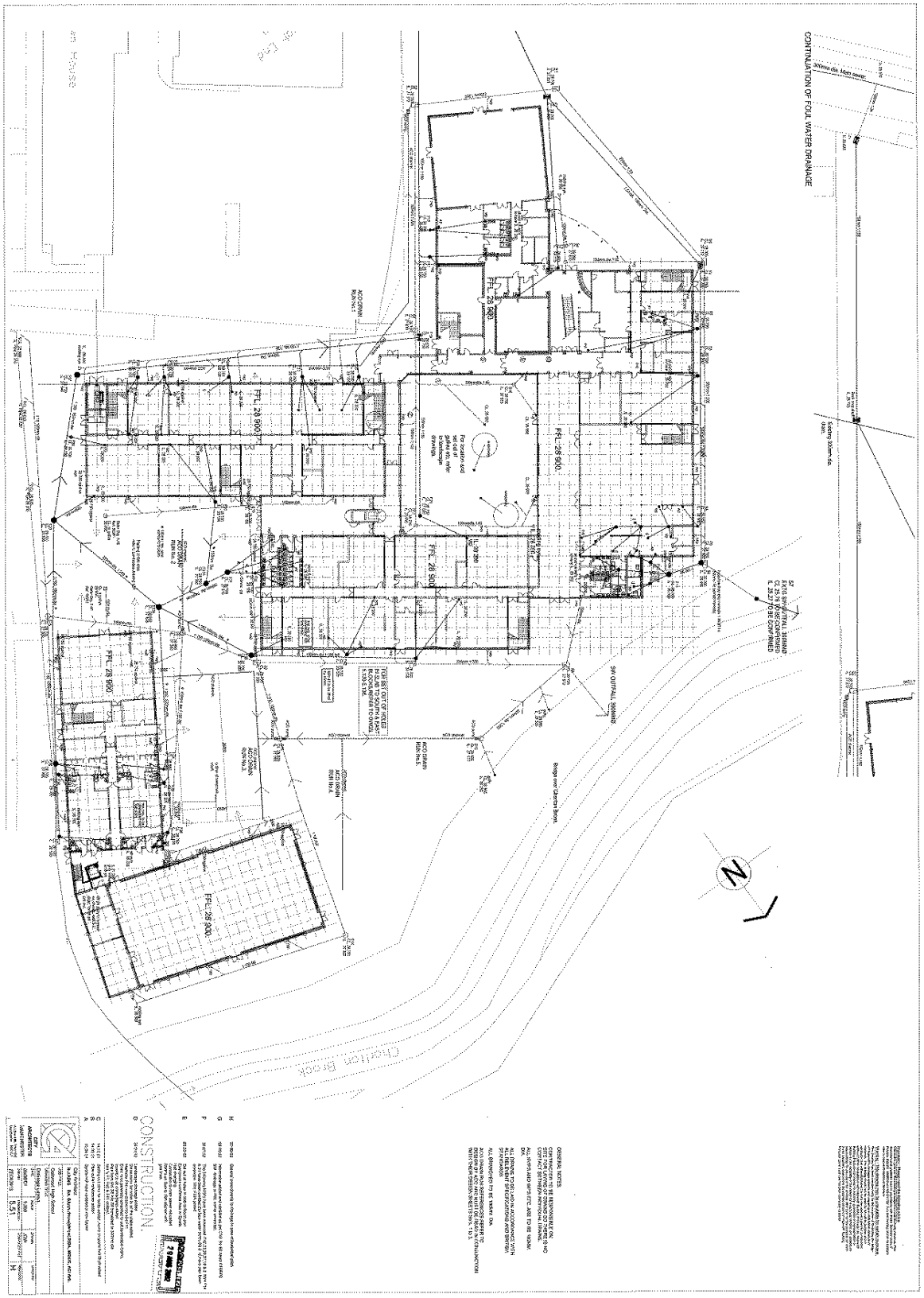
Recommendations / Outcomes

Although the delivery of SuDS interventions on site would not achieve a change in banding charge for the school there would still be the opportunity to deliver some meaningful interventions that could provide a range of benefits. For example green roofs if feasible (subject to loading capacity) could provide insulation benefits and therefore savings on heating and cooling costs. Bio-retention areas in the car park could provide a water cleaning function with respect to surface water runoff contaminated by hydrocarbons and heavy metals from the heavy traffic using the car park. While a wetland area adjacent to the Astro Turf sports pitches could provide a significant habitat space for fauna and flora which would be an educational resource for the students. Subsoil analysis would be required to ascertain the feasibility of infiltration and water storage SuDS features.

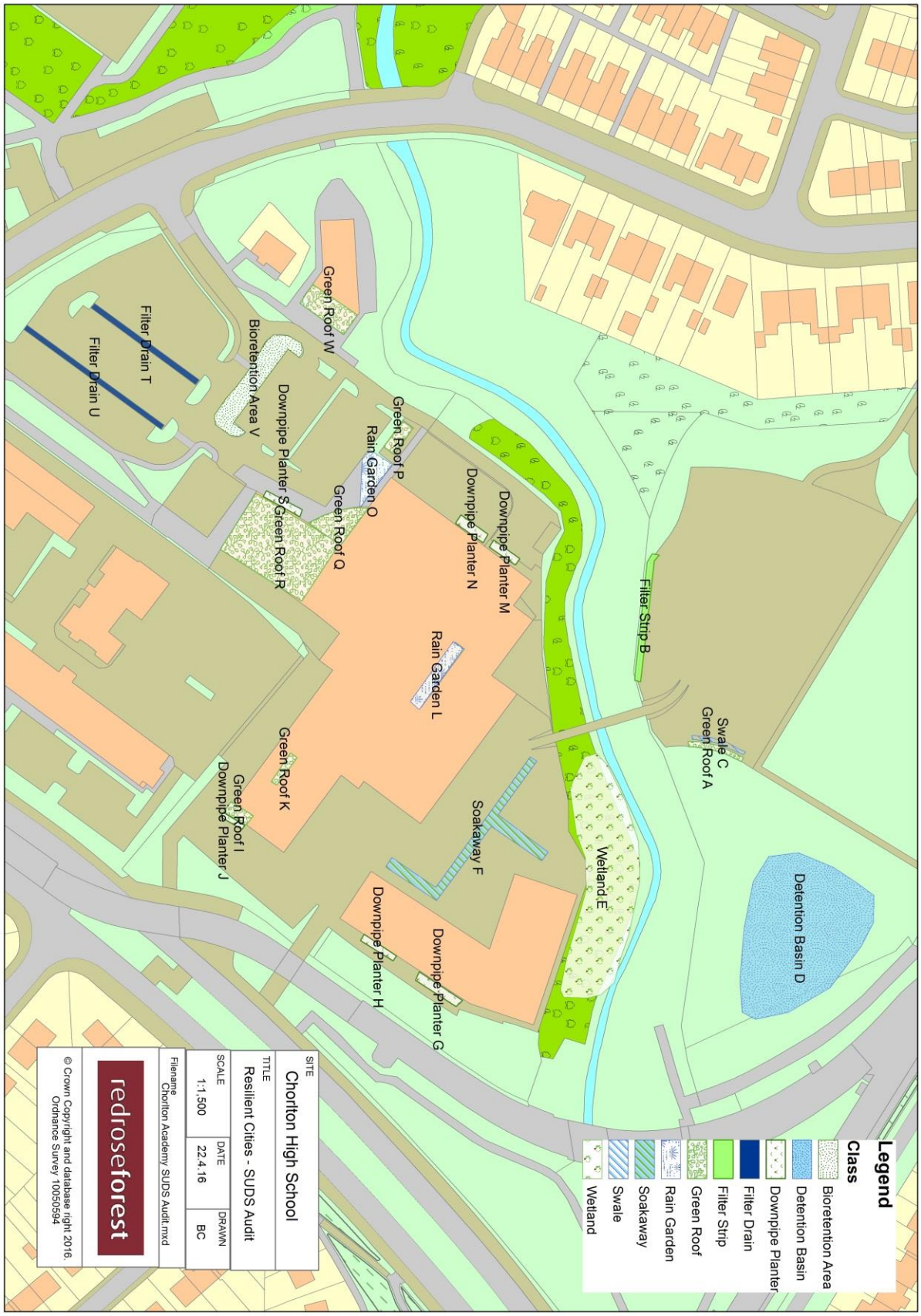
To view the completed 'Business in the Community Ready- Reckoner' which sets out all the potential interventions, see Appendix 3.

The SuDS audit at Chorlton High School proved a valuable exercise in testing the SuDS tool kit and helped to highlight the types of constraints that need to be further investigated such as sub soil conditions and roof structure when thinking about next steps on the road to potential delivery.

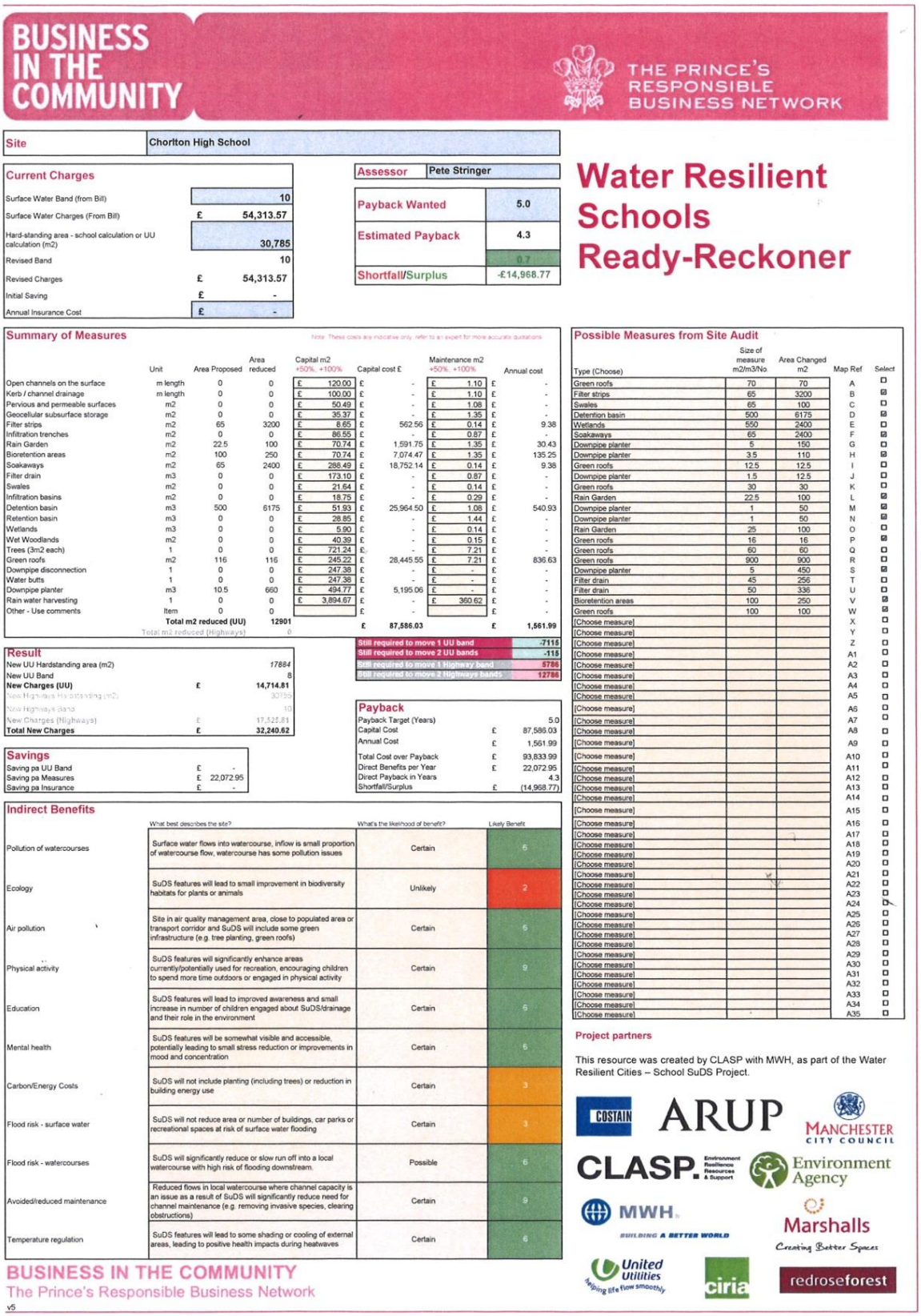
Appendix 1 - Chorlton High School Site Drainage layout



Appendix 2 – Chorlton High School – Potential SuDS Interventions



Appendix 3 - Completed 'Business in the Community Ready Reckoner'



BUSINESS IN THE COMMUNITY

THE PRINCE'S RESPONSIBLE BUSINESS NETWORK

Site	Chorlton High School

Current Charges		
Surface Water Band (from Bill)		10
Surface Water Charges (From Bill)	£	54,313.57
Hard-standing area - school calculation or UU calculation (m2)		30,785
Revised Band		10
Revised Charges	£	54,313.57
Initial Saving	£	-
Annual Insurance Cost	£	-

Assessor	Pete Stringer
Payback Wanted	5.0
Estimated Payback	4.3
	0.7
Shortfall/Surplus	-£14,968.77

Water Resilient Schools Ready-Reckoner

Summary of Measures

Note: These costs are indicative only, refer to an expert for more accurate quotations

	Unit	Area Proposed	Area reduced	Capital m2 +50% +100%	Capital cost £	Maintenance m2 +50% +100%	Annual cost
Open channels on the surface	m length	0	0	£ 120.00	£ -	£ 1.10	£ -
Kerb / channel drainage	m length	0	0	£ 100.00	£ -	£ 1.10	£ -
Pervious and permeable surfaces	m2	0	0	£ 50.49	£ -	£ 1.08	£ -
Geocellular subsurface storage	m2	0	0	£ 35.37	£ -	£ 1.35	£ -
Filter strips	m2	65	3200	£ 8.65	£ 562.56	£ 0.14	£ 9.38
Infiltration trenches	m2	0	0	£ 86.55	£ -	£ 0.87	£ -
Rain Garden	m2	22.5	100	£ 70.74	£ 1,591.75	£ 1.35	£ 30.43
Bioretention areas	m2	100	250	£ 70.74	£ 7,074.47	£ 1.35	£ 135.25
Soakaways	m2	65	2400	£ 288.49	£ 18,752.14	£ 0.14	£ 9.38
Filter drain	m3	0	0	£ 173.10	£ -	£ 0.87	£ -
Swales	m2	0	0	£ 21.64	£ -	£ 0.14	£ -
Infiltration basins	m2	0	0	£ 18.75	£ -	£ 0.29	£ -
Detention basin	m3	500	6175	£ 51.93	£ 25,964.50	£ 1.08	£ 540.93
Retention basin	m3	0	0	£ 28.85	£ -	£ 1.44	£ -
Wetlands	m3	0	0	£ 5.90	£ -	£ 0.14	£ -
Wet Woodlands	m2	0	0	£ 40.39	£ -	£ 0.15	£ -
Trees (3m2 each)	1	0	0	£ 721.24	£ -	£ 7.21	£ -
Green roofs	m2	116	116	£ 245.22	£ 28,445.55	£ 7.21	£ 836.63
Downpipe disconnection	1	0	0	£ 247.38	£ -	£ -	£ -
Water butts	1	0	0	£ 247.38	£ -	£ -	£ -
Downpipe planter	m3	10.5	660	£ 494.77	£ 5,195.06	£ -	£ -
Rain water harvesting	1	0	0	£ 3,894.67	£ -	£ 360.62	£ -
Other - Use comments	Item	0	0		£ -		£ -
	Total m2 reduced (UU)		12901		£ 87,586.03		£ 1,561.99
	Total m2 reduced (Highways)		0				

Still required to move 1 UU band	-7115
Still required to move 2 UU bands	-115
Still required to move 1 Highway band	5786
Still required to move 2 Highways bands	12786

Result

New UU Hardstanding area (m2)		17884
New UU Band		8
New Charges (UU)	£	14,714.81
New Highways Hardstanding (m2)		30755
New Highways Band		10
New Charges (Highways)	£	17,525.81
Total New Charges	£	32,240.62

Payback

Payback Target (Years)		5.0
Capital Cost	£	87,586.03
Annual Cost	£	1,561.99
Total Cost over Payback	£	93,833.99
Direct Benefits per Year	£	22,072.95
Direct Payback in Years		4.3
Shortfall/Surplus	£	(14,968.77)

Savings

Saving pa UU Band	£	-
Saving pa Measures	£	22,072.95
Saving pa Insurance	£	-

Indirect Benefits

	What best describes the site?	What's the likelihood of benefit?	Likely Benefit
Pollution of watercourses	Surface water flows into watercourse, inflow is small proportion of watercourse flow, watercourse has some pollution issues	Certain	6
Ecology	SuDS features will lead to small improvement in biodiversity habitats for plants or animals	Unlikely	2
Air pollution	Site in air quality management area, close to populated area or transport corridor and SuDS will include some green infrastructure (e.g. tree planting, green roofs)	Certain	6
Physical activity	SuDS features will significantly enhance areas currently/potentially used for recreation, encouraging children to spend more time outdoors or engaged in physical activity	Certain	9
Education	SuDS features will lead to improved awareness and small increase in number of children engaged about SuDS/drainage and their role in the environment	Certain	6
Mental health	SuDS features will be somewhat visible and accessible, potentially leading to small stress reduction or improvements in mood and concentration	Certain	6
Carbon/Energy Costs	SuDS will not include planting (including trees) or reduction in building energy use	Certain	3
Flood risk - surface water	SuDS will not reduce area or number of buildings, car parks or recreational spaces at risk of surface water flooding	Certain	3
Flood risk - watercourses	SuDS will significantly reduce or slow run off into a local watercourse with high risk of flooding downstream.	Possible	6
Avoided/reduced maintenance	Reduced flows in local watercourse where channel capacity is an issue as a result of SuDS will significantly reduce need for channel maintenance (e.g. removing invasive species, clearing obstructions)	Certain	9
Temperature regulation	SuDS features will lead to some shading or cooling of external areas, leading to positive health impacts during heatwaves	Certain	6

Possible Measures from Site Audit

Type (Choose)	Size of measure m2/m3/No.	Area Changed m2	Map Ref	Select
Green roofs	70	70	A	☐
Filter strips	65	3200	B	☑
Swales	65	100	C	☐
Detention basin	500	6175	D	☑
Wetlands	550	2400	E	☐
Soakaways	65	2400	F	☑
Downpipe planter	5	150	G	☐
Downpipe planter	3.5	110	H	☑
Green roofs	12.5	12.5	I	☐
Downpipe planter	1.5	12.5	J	☐
Green roofs	30	30	K	☐
Rain Garden	22.5	100	L	☑
Downpipe planter	1	50	M	☑
Downpipe planter	1	50	N	☑
Rain Garden	25	100	O	☐
Green roofs	16	16	P	☑
Green roofs	60	60	Q	☐
Green roofs	900	900	R	☐
Downpipe planter	5	450	S	☑
Filter drain	45	256	T	☐
Filter drain	50	336	U	☐
Bioretention areas	100	250	V	☑
Green roofs	100	100	W	☑
[Choose measure]			X	☐
[Choose measure]			Y	☐
[Choose measure]			Z	☐
[Choose measure]			A1	☐
[Choose measure]			A2	☐
[Choose measure]			A3	☐
[Choose measure]			A4	☐
[Choose measure]			A5	☐
[Choose measure]			A6	☐
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This resource was created by CLASP with MWH, as part of the Water Resilient Cities – School SuDS Project.

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