

APPENDIX C

Options Long-list Assessment

Reach 1 - Upstream of GlaxoSmithKline (GSK) Pharmaceutical works

Options		Include in Short List?	Reason for inclusion or rejection
1.1 Do nothing		X	○ Preferred option for main river channel
1.2 Remediate impacts of pond construction and highways drainage impacts on scheme	a) Discuss issue with pond landowner on formal visit by EA – give the landowner a 6 month period in which to line or fill in their pond.	X	○ Recommend implementation immediately – EA Team to action – no need to include in shortlist
	b) Issue a letter requiring maintenance of silt trap structure by the Highways Agency from the EM team	X	○ Recommend implementation immediately – EA Team to action – no need to include in shortlist
1.3 Reed bed – excavated silt trap at bottom of reach (also linked to option 2.6)		X	○ Viability adversely affected by preferred option for reach 2 – not taken forward

Reach 2 – GSK Culvert

All of these options have in all likelihood been negated and removed from the short-list because GSK are (independently of the EA project) seeking to re-route their culvert flows in a new open channel around the northern perimeter of their site. Although driven by an objective to increase their control over flows leaving their site, their option may contribute to an improved WFD assessment for the Teville.

Options		Include in Short List?	Reason for inclusion or rejection
2.1 Do nothing		X	<ul style="list-style-type: none"> Preferred option Also maintain the dialogue with GSK regarding any options to diver the main river course and inlet from surface water drainage Do minimum costs – speak to bruno/graham gsk
2.2 Divert entire reach around GSK site by using various sub-options;	a) Widen and deepen existing channel within existing field boundary	X	<ul style="list-style-type: none"> Due to levels of existing ground requiring deep cutting and the high level of the chalk locally requiring lining, this group of options will not be taken forward
	b) New straight channel adjacent to field boundary – distance to be confirmed but enough to stay clear of mature tree's roots	X	
	c) New channel with meandering plan-form away from mature tree root system	X	
	d) As for b) or c) but with reduced land take by engineered retained walls at deeper sections to reduce land take	X	
	e) As for b) or c) but with wider, multi stage channel	X	
	f) As for b) or c) but raise water level at upstream end of reach (DS end of reach 1) by up to 1m to reduce need for excavation – create standing water/pond just north of GSK	X	<ul style="list-style-type: none"> Due to levels of existing ground requiring deep cutting and the high level of the chalk locally requiring lining, this group of options will not be taken forward
2.3 Divert through GSK sports field		X	<ul style="list-style-type: none"> Not taken forward for constraints identified
2.4 Include riffles, log drop structures		X	<ul style="list-style-type: none"> Viability adversely affected by preferred option for reach 2 – not taken forward See option 2.2
2.5 include pools, standing water type sections		X	<ul style="list-style-type: none"> Viability adversely affected by preferred option for reach 2 – not taken forward See option 2.2

Reach 3 – From GSK Outfall to the Deacon Way Culvert

Options		Include in Short List?	Reason for inclusion or rejection
3.1 Do nothing		✓ SL1A	<ul style="list-style-type: none"> May be used as main option with other options in places Included to assess benefits
3.1 Do Minimum		✓ SL1B	<ul style="list-style-type: none"> May be used as main option with other options in places Included to assess benefits
3.2 Divert main river around this reach: note, there are still significant inputs from GSK's culvert	a) using existing channel network widened and deepened - two sub options routes are shown; Red – historic channel, now partially filled in Yellow – uses network of drainage ditches	✓ SL1C	<ul style="list-style-type: none"> Red route would not be preferred Yellow route to be costed and investigated Minimum excavation and land purchase value
	b) using new channels	✓ SL1C	<ul style="list-style-type: none"> New channel alignment investigated further Land between new channel alignment would
	c) Divert main channel from start of reach 2 to the railway culvert through fields – reverse flow in east-west ditch widen and deepen existing east channel to take GSK flows	✗	<ul style="list-style-type: none"> See Reach 2
	d) as a), b) or c but raise water level to reduce excavation Possibly include excavation of the Giant Hogweed corner of the field to below WL	✗	<ul style="list-style-type: none"> See Reach 2
3.3 Create reed bed at GSK outfall by	a) dredging existing channel by <1m, potentially adding flexible concrete/nylon block work as a base	✗	<ul style="list-style-type: none"> Improvement in water quality Insufficient room in channel Reduced GSK flows (see Reach 2) negate option
	b) using 'Hogweed field' (between GSK silos and north end of deacon way landfill) as reedbed	✓ SL1E	<ul style="list-style-type: none"> Improvement in water quality Habitat area
3.4 Narrow channel and make shallower in places, especially towards Deacon Way route		✓ SL4A	<ul style="list-style-type: none"> Increase structural heterogeneity Use excess fill
3.5 Reverse flow from Deacon Way culvert entrance heading North by maintaining Surface water inflows		✓ SL1C & SL1D	<ul style="list-style-type: none"> Fits well with preferred option of deacon way culvert

Reach 4 – Deacon Way Culvert

Options	Include in Short List?	Reason for inclusion or rejection
4.1 Do minimum (note; Do nothing option not possible at this site, as maintenance is required)	X	<ul style="list-style-type: none"> ○ Include as a do min for costing
4.2 Daylight culvert – take off top and cutback/retain sides	X	<ul style="list-style-type: none"> ○ Landuse and ownership issues ○ Limited opportunity to improve water quality ○ Interaction with buried services ○ Disproportionately expensive ○ Contaminated land issues ○ Access issues
4.3 Seal culvert and fill voids (we have to state the alternative channel option(s))	X	<ul style="list-style-type: none"> ○ Inflows from surface water drainage will require rerouting at significant expense
4.4 Block culvert in the middle, allowing some surface water drainage flows in both directions (see option 3.5)	X	<ul style="list-style-type: none"> ○ Allowing flows to continue to the north could be problematic, especially in flood conditions ○ Potential for increased concentrations of leachate contaminants (Why if no flow would it leach? I agree what is there would concentrate) ○ Working in a confined space (could be done by injection from above)
4.5 Block Culvert at inlet and allow flow in only south direction	✓ SL1C & SL1D	<ul style="list-style-type: none"> ○ Least cost ○ Avoids confined space hazards ○ Maintains both habitats ○ Makes maximum use of remaining life of the culvert
4.6 Reline culvert and continue to accept surface water drainage	X	<ul style="list-style-type: none"> ○ Could be delayed – little advantage to include this as part of this project stage ○ No WFD benefits

Reach 5 – From Deacon Way Culvert to the Railway line

Options	Include in Short List?	Reason for inclusion or rejection
5.1 Do nothing	✓ SL1A	○ Taken forward to short list for comparison (will not contribute to WFD measures)
5.2 Narrow channel and make shallower in places	✓ SL4B	○ Taken forward to short list
5.3 Deepen channel to increase settlement of silt	✓ SL4B	○ Taken forward to short list
5.4 Infill channel	✗	○ Destroys natural habitat ○ No wfd benefit ○ Existing surface water drainage network would require re-routing
5.5 Water level control structure to create new wetland habitat	✗	○ Not going to contribute to WFD assessment ○ Could be taken forward as part of another project that requires the creation of freshwater wetland habitat if suitable local project can be identified

Downstream of the Railway Line

Reach 6 – From Railway to Landfill Culvert

Options	Include in Short List?	Reason for inclusion or rejection
6.1 Do nothing	✓ SL2A	○ Least risk
6.2 Create silt traps and reed beds to reduce silt movement downstream	✗	○ Disturbing a quiet, relatively naturalised section of the river is unnecessary
6.3 Deepen channel over short stretches to create pools for water for allotment	✗	○ Disturbing a quiet relatively naturalised section of the river is unnecessary
6.4 Narrow channel and make shallower in places	✗	○ Disturbing a quiet relatively naturalised section of the river is unnecessary
6.5 Open the culvert Containing the old Teville Stream, currently surface water drainage from south-east Worthing, by creating a new channel	✗	○ New habitat ○ Improved quality of water into system

Reach 7 – Landfill culvert

Options	Include in Short List?	Reason for inclusion or rejection
7.1 Do nothing	✓ SL2A	○ Included for comparison but impact upon flood risk likely prevent progression of option
7.2 Do-minimum - Programme of regular inspections, enabling works, and local repairs to failed culvert structure.	✓ SL2B	○ Taken forward – investigate the possibility of polyurethane injection to raise sunk section of culvert
7.3 Repair entire culvert structure by relining	x	○ Likely excessive cost ○ On hold, not appraised until results of survey known
7.4 Daylight/Open culvert	x	○ Excessive cost and complexity compared to benefits achievable ○ On hold, not appraised until results of survey known
7.5 Bypass landfill via route to the north or south	x	○ Excessive cost and complexity ○ On hold, not appraised until results of survey known

Reach 8 – From Landfill Culvert to Brooklands Lake

Options	Include in Short List?	Reason for inclusion or rejection
8.1 Do nothing	X	○ No WFD benefits
8.2 Do-minimum – current level of maintenance	✓ SL3B	○ Baseline by which to measure other options
8.3 Create silt traps and reed beds to reduce silt movement downstream	✓ SL4E	○ Limited opportunity to make meaningful contribution to WFD benefits
8.4 Narrow channel and make shallower in places	✓ SL4F	○ Limited opportunity to make meaningful contribution to WFD benefits
8.5 Remediate contamination from culvert emanating from the Lancing industrial estate – possibly Install silt trap/interceptor to control the contaminant pathway	X	○ Significant opportunity to remediate ongoing issue ○ On hold, not appraised until results of survey known

Reach 9 – Brooklands Lake and Outfall

Options	Include in Short List?	Reason for inclusion or rejection
9.1 Do nothing	X	<ul style="list-style-type: none"> ○ No WFD benefits
9.2 Do-minimum – current level of maintenance	✓ SL3B	<ul style="list-style-type: none"> ○ No WFD benefits ○ Maintenance through suction dredging no longer an option due to contaminated waste ○ 10-12k worth of bank maintenance/year
9.3 Dredge lake – create islands in some form of constraint e.g. a. silt, in bags, b. sheet-pile surround, c. poles & geotextile walls d. willow spiles	✓ SL3C	<ul style="list-style-type: none"> ○ Best technical option ○ Remediation on site in line with EA Guidelines for contamination remediation
9.4 Mobilise contaminated silt and evacuate to sea without causing a pollution risk – a. aeration b. pumps c. using long Southern Water outfall	X	<ul style="list-style-type: none"> ○ Least cost option ○ Potentially illegal
9.5 Turn Brooklands into a saline lagoon / intertidal area by regulated tidal exchange or similar	✓ SL3D	<ul style="list-style-type: none"> ○ Maximum WFD benefits ○ Possible opportunities to work with local community environmental education projects