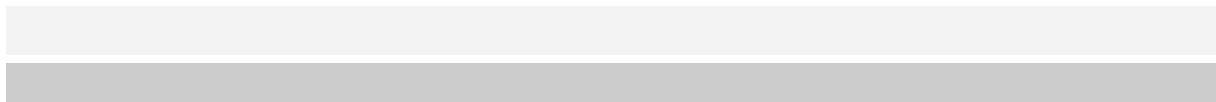


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1. Purpose

The purpose of this document is to present the technical requirements for Water Cannon (WC). As outlined in the Background and WC Options sections below, there are two different approaches that the National Water Cannon Project Board is taking in terms of timeframes for availability of WC to England & Wales' police forces.

Accordingly, the technical requirements have also been split to identify those key requirements that are essential for consideration to support the interim WC option and these are highlighted within this document.

The technical requirements for the WC long term option will be reviewed and updated in light of testing results from the interim WC and any operational use.

2. WC Operational Requirements

The WC Project Board has been responsible for creating the specific operational requirements (OR) for WC, v2.0 of which were approved by CC Ian Learmonth, National Policing Lead for Public Order and Public Safety.

CAST has developed the initial technical requirements for WC from these specific operational requirements and the learning from the baseline testing of the PSNI Somati WC.

3. Technical Requirements – WC Interim Option - Purchase

The table below contains the list of technical requirements, based on the WC Operating Requirements v2.0 as signed by CC Ian Learmonth. These have been defined as essential, highly desirable or desirable for the purchase of an interim option and also for the long term option, where a bespoke-build vehicle will be purchased.

This full list will form the basis of the Technical Requirements – WC Long Term Option, but will be reviewed following technical assessment of an interim option and also any operational use of the interim WC.

For reference, the Technical Requirements - WC Interim Option - Baseline have been highlighted either Green – must test/establish or Amber – need to understand or be mitigated (e.g. by procedures or MPS) for reference. To establish baseline data, these requirements were used when assessing the PSNI WC to determine the water jet forces and pressures.

These technical requirements exclude any requirement which is in relation to the mechanical aspects of the vehicle (e.g. turning circle) or operational usage. CAST will advise and support work on these areas.

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-1	The water cannon shall continue to be operational with no loss of functionality in heavy rain (>1hr, 7.6mm/hr rate, droplet size >5mm) ¹	WC-OR-1.1	Desirable	Essential
WC-TR-2	The water cannon shall continue to be operational with no loss of functionality with an external recorded temperature of -10°C	WC-OR-1.1	Desirable	Essential
WC-TR-3	The water cannon shall continue to be operational with no loss of functionality with external recorded temperature of +30°C	WC-OR-1.1	Desirable	Essential

¹ American Metrological Society (<http://glossary.ametsoc.org/wiki/Rain>)

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-4	The water cannon must be usable in night time conditions with no street lighting (0.27–1.0 lux ^{2,3})	WC-OR-1.3	Essential	Essential
WC-TR-5	The water cannon must be usable in twilight conditions (100 lux ³)	WC-OR-1.3	Essential	Essential
WC-TR-6	The water cannon must be usable in daytime, low light conditions (1,000 lux ³)	WC-OR-1.3	Essential	Essential
WC-TR-7	The water cannon must be usable in daylight, bright sunshine conditions (10,000–25,000 lux ³)	WC-OR-1.3	Essential	Essential
WC-TR-8	The water cannon must enable the trained police operator to be able to target and track, with a water jet, a moving person, <redacted>, moving in any direction, at either walking or running speeds	WC-OR-1.4	Desirable	Desirable
WC-TR-9	<redacted>	<redacted>	Essential – CAST to advise MPS (<redacted>)	Essential
WC-TR-10	<redacted>	<redacted>	Highly Desirable	Essential
WC-TR-11	<redacted>	<redacted>	Highly Desirable	Essential

² Lux = unit of illuminance, equal to one lumen per square meter

³ Paul Schlyter, [Radiometry and photometry in astronomy FAQ](#) (2006)

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-12	The water cannon shall have a one way valve on the filling system to ensure that it does not contaminate the water supply network	WC-OR-2.7	Essential	Essential
WC-TR-13	The indicated water pump pressure of the water cannon must be adjustable to provide a range of pressures to enable the measured force on contact of each jet to be equivalent to the PSNI Somati 9000 water cannon.	WC-OR-3.1/ WC-OR-4.1/ WC-OR-5.1	Difficult to measure actual pressure at pump due to access	Essential
WC-TR-14	The main water pump pressure that is available to all monitors must be controllable from the commanders position only	WC-OR-3.1/ WC-OR-4.1/ WC-OR-5.1	Essential	Essential
WC-TR-15	Each monitor must have separate controls to allow the water pressure from the monitor to be controlled by the operator, in addition to those limits on the overall pump pressure set by the commander	WC-OR-3.1/ WC-OR-4.1/ WC-OR-5.1	Essential	Essential
WC-TR-16	The output of the water cannon from each forward facing monitor (as a minimum) must be adjustable to provide an indirect spray (rain / shower effect) or a focused spray (direct jet) at all pressures	WC-OR-3.1/ WC-OR-4.1/ WC-OR-5.1	Essential	Essential
WC-TR-17	The measured contact force/pressure must be equivalent to the contact force/pressure measured by the same system from a Somati water cannon currently in use by PSNI (when measured by CAST's measurement systems)	WC-OR-1.5 / WC-OR-3.1	Essential	Essential
WC-TR-18	The forward facing monitors must have a minimum range <redacted> in direct spray mode and a minimum range of <redacted> in indirect spray mode	WC-OR-3.2/ WC-OR-4.2/ WC-OR-5.2	Need to know min. & max. distance	Essential

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-19	The water jet from each forward facing monitor must be able to target, and maintain position on, a stationary object at <redacted>	WC-OR-5.1	Will test to establish capability	Essential
WC-TR-20	The water jet from each forward facing monitor must be able to spray (in indirect mode) a stationary group of 5 people standing side by side (2m total width) at a distance <redacted>	WC-OR-4.1	Will test to establish capability	Essential
WC-TR-21	The water jet from each forward facing monitor must be able to target and sweep (in direct mode) across a stationary group < of 5 people standing side by side (2m total width) at a distance <redacted>	WC-OR-4.1	Will test to establish capability	Essential
WC-TR-22	The water cannon must be refillable from a standard UK fire hydrant operating at a minimum pressure of 1.5 bar ⁴	WC-OR-6.2	Highly Desirable	Essential
WC-TR-23	The water cannon must be refillable from an open water source	WC-OR-6.2	Desirable	Essential
WC-TR-24	The water cannon must be able to filter water taken from an open water source to restrict the ingress of debris to the water tank.	WC-OR-6.2	Will test to establish capability	Essential
WC-TR-25	The water cannon must be resistant to the effects of salt water	WC-OR-6.3	Desirable	Desirable
WC-TR-26	The water cannon must be able to operate over a long wheel base Protective personnel carrier with a height of 3m	WC-OR-6.4	Desirable	Desirable

⁴ This is based on the minimum requirements on water companies and is subject to regional variation (<http://www.water.org.uk/home/policy/publications/archive/industry-guidance/national-guidance-document/national-guidance-document-on-water-for-ffg-final.pdf>)

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-27	The water cannon shall be able to mix additives at the point of spray	WC-OR-6.5	Not Required	Desirable ⁵
WC-TR-28	The water cannon shall be able to remove temporary barricades to the size of a family car and weighing up to 2 tonnes	WC-OR-6.6	Desirable	Desirable
WC-TR-29	The water cannon shall have a public address system capable of being intelligible at a distance <redacted> over the noise of the vehicle. RASTI ⁶ level of greater than 0.6 or equivalent test	WC-OR-6.7	Desirable	Essential
WC-TR-30	The water cannon shall include a system to play up to 50 pre-recorded messages over the public address system	WC-OR-6.8	Desirable	Essential
WC-TR-31	The water cannon shall include a system to enable the recording and playback of messages for use on the public address system	WC-OR-6.8	Desirable	Essential
WC-TR-32	The water cannon must have an audible reversing warning that can be heard above the noise of the water cannon by an officer wearing their “headover” (flame retardant balaclava) and a standard issue Home Office approved public order helmet. Additionally a reversing camera system is desirable	WC-OR-6.9	Essential	Essential

⁵ This is a possible consideration for the long term requirement only at present.

⁶ http://www.isvr.co.uk/spe_hear/comint.htm (RApid Speech Transmission Index RASTI)

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-33	The water cannon must have a selectable audible warning system to indicate that the vehicle is moving and that can be heard above the noise of the water cannon by an officer wearing a headover and a standard issue Home Office approved public order helmet	WC-OR-6.9	Desirable	Essential
WC-TR-34	DOT Matrix display capable of displaying a minimum of 100 characters and readable <redacted> in lighting conditions specified in TR4 to TR7	WC-OR-6.10	Desirable	Desirable
WC-TR-35	The water cannon shall record all uses, including date, time, duration and output pressure for each monitor	WC-OR-6.11	Desirable – need to understand limitations	Essential
WC-TR-36	The water cannon shall enable the recording of decisions and commands issued.	WC-OR-6.11	Desirable	Desirable
WC-TR-37	The water cannon must have visual and audio recording capability, providing 360° coverage around the vehicle and functional in all lighting conditions (TR4 to TR7) and weather conditions (TR1 to TR3).	WC-OR-6.12	Desirable	Essential
WC-TR-38	The water cannon must have independent cameras on each water jet to record usage in all lighting conditions (TR4 to TR7) and weather conditions (TR1 to TR3).	WC-OR-6.12	Desirable	Essential
WC-TR-39	The water cannon shall have a extendable camera system with a working height above the water cannon roof of 2 metres as a minimum, that is functional in all lighting conditions (TR4 to TR7) and weather conditions (TR1 to TR3).	WC-OR-6.13	Desirable	Essential

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-40	The water cannon shall have flood lighting connected to the monitors and capable of illuminating an object at a distance <redacted>, at night (WC-TR-4). (Expect light level <redacted> of 320 to 500 lux ⁸)	WC-OR-6.14	Desirable	Desirable
WC-TR-41	The water cannon shall have illumination around the vehicle to enable an area of 3m radius to be illuminated to create a safe working environment as required, to a light level of 320–500 lux ⁷	WC-OR-6.14	Desirable	Desirable
WC-TR-42	The water cannon shall include a data link to enable the transmission of video and audio footage in real time to a control centre ⁸	WC-OR-6.15	Desirable	Desirable
WC-TR-43	The temperature of the stored water must be > 4°C	WC-OR-6.16	Essential – need to ascertain how this is achieved.	Essential
WC-TR-44	Each forward facing monitor shall have a range finder linked to the direction that the monitor is pointing in and accurate to within 0.2m	WC-OR-6.17	Desirable	Highly Desirable
WC-TR-45	The water cannon shall have the capability to tackle fires, either directly using the monitors or directly from the water pump via hose reels	WC-OR-6.18	Desirable	Essential
WC-TR-46	The doors shall be internally locking	WC-OR-7.1 / WC-OR-1.2	Essential	Essential

⁷ [Illumination](#)". Regulations (Standards - 29 CFR). Occupational Safety and Health Administration, US Dept. of Labor

⁸ Specification to be defined for long term purchase option

Unique ID	Technical Requirement (TR)	Link to Operating Requirements	Interim Option - Purchase	Long Term Option
WC-TR-47	<redacted>	WC-OR-7.1 / WC-OR-1.2	Desirable	Essential
WC-TR-48	<redacted>	<redacted> / WC-OR-1.2	Desirable	Essential
WC-TR-49	<redacted>	WC-OR-7.5 / WC-OR-1.2	Desirable	Desirable
WC-TR-50	The water cannon shall have temperature regulation in the operators area between +15°C to +25°C	WC-OR-7.6 / WC-OR-1.2	Desirable	Essential
WC-TR-51	<redacted>	WC-OR-7.7	Desirable	Essential
WC-TR-52	The water cannon shall include a system for extinguishing fires on the external surfaces of the vehicle	WC-OR-7.7	Essential	Essential
WC-TR-53	The noise level in the cabin must not exceed The Control of Noise at Work Regulations (2005)	WC-OR-1.2	Essential – or mitigate via protective equipment	Essential
WC-TR-54	Any intercom system/external communication equipment shall be intelligible in cab using the required equipment (e.g. headset, microphones etc). RASTI level of 0.6 or greater (or equivalent test method)	WC-OR-1.2	Desirable	Essential