Capital Delivery Alliance
Cynghrair Cyflawni Cyfalaf

MORGAN SINDALL | ARUP

Northumberland SPS L2 Driver

Driver: Northumberland SPS serves Llanelli Town Central on the shores of the Loughor Estuary, a designated Shellfish Water. It is a fully combined catchment of 45,000 people. The asset includes a CSO which, at the start of AMP5, used to spill 79 times per year. DCWW investment in RainScape since 2010 has reduced that spill frequency to 44. The last stage of work will reduce that frequency to 10 in line with Shellfish Water requirements.

Challenges

- Northumberland SPS can currently only achieve 750 l/s PFF due to hydraulic inefficiencies and poor pump performance.

- The SPS is 15m dia and 11m deep with restricted access. Flows into the wet well are highly variable with instant and significant response to rainfall, up to 4,000 l/s. Cleaning and survey of the asset required significant planning and coordination.

- A Point cloud survey was commissioned to minimise man entry time and also to provide comprehensive information on the asset .

- A physical model of the asset was built to allow us to fully understand the root cause of the hydraulic inefficiencies and develop suitable, buildable solutions.

- Due to the scale of the issue at Northumberland and Llanelli WwTW's, the sheer number of options, combinations and iterations, made it extremely difficult to unearth the right solution for DCWW.

- Collaborative planning and a staged R&V strategy provided the foundation for DCWW's Capital Delivery Alliance to find and develop the best option.

Spend Profile

- £15m invested in AMP5 on catchment wide RainScape. Much of this work benefited other assets in the catchment.

- £26m invested in upstream NEP assets; Burry Port SPS, Pwll SWO, Pwll SPS and Cambrian SPS. This work included 17ha RainScape which benefited Northumberland.

- c£20m on Station Road surface water tunnel and pumping station with 12ha RainScape connected. The tunnel and SPS is sized to offer DCWW resilience against future network growth and deterioration.

-£17 m investment into Northumberland SPS to increase PFF to 1,100 l/s and optimise the storm return system, making best use of the existing 2,800m³ storage.

Key Facts

- New pumps are VSD submersible pumps. Four are large with 250 kW rating and four are small with a 37kW rating.

- Installation will use eight new submersible centrifugal sewage pumps as well as six existing storm pumps.

-Wet well modifications to ensure 6 No. ST3 Grundfos submersible canister storm pumps with 130kW rating achieve their design pass forward flow.

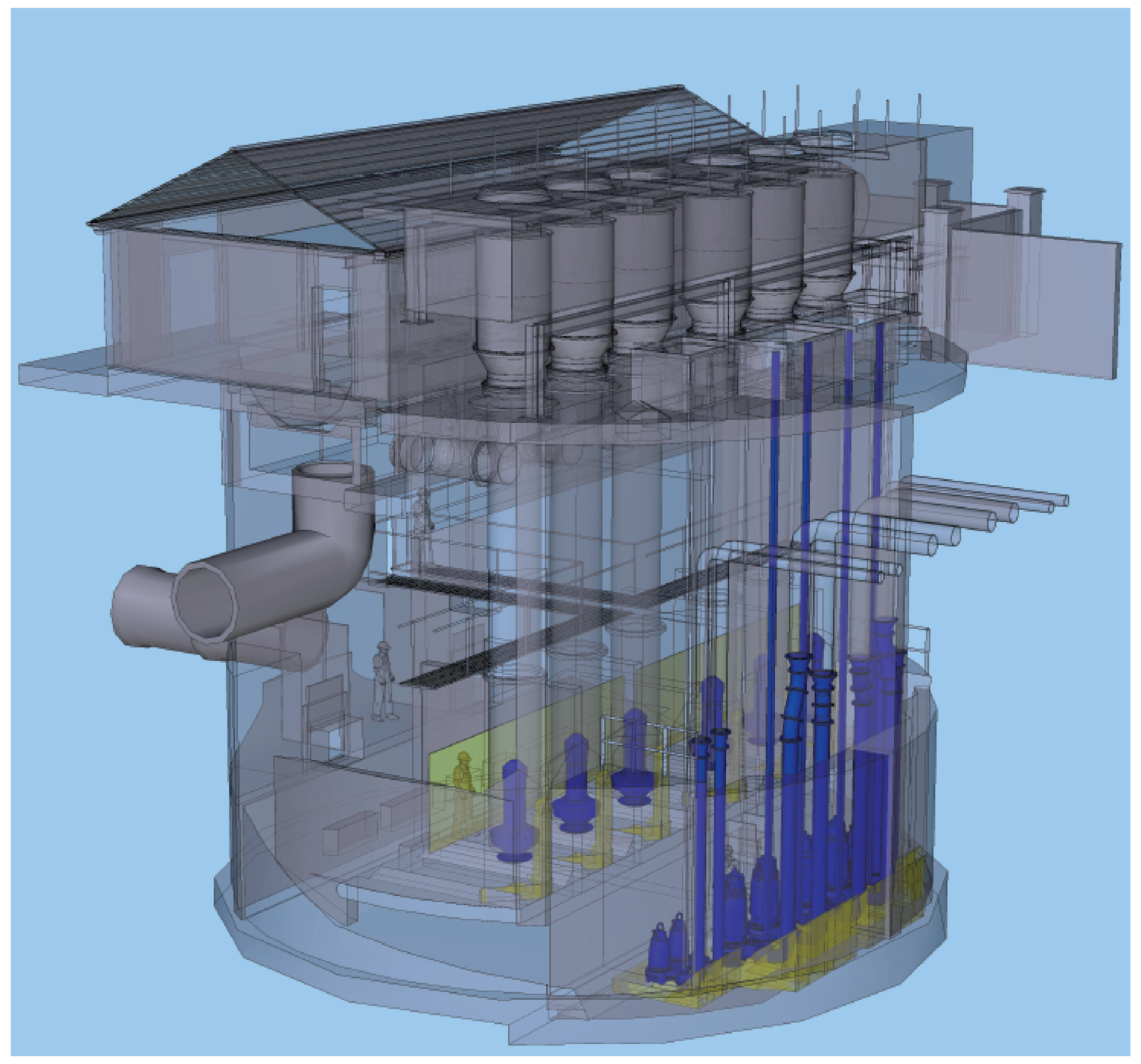
- The Static head is 18.72m.

- The rising main is 3877m long, 900mm dia DI with 7 no. air valves. The air valves are to be replaced as part of the work.

- The existing storage provision is 2,800m³. This will be increased by 2,000m³ to 4,800m³.

- The storage tank is proposed to be rectangular, 25m by 18m and 6m depth. Vacuum flush cleaning system to be installed.

- The storm return from Northumberland tanks is currently set to 170 l/s and is likely to remain the same.



Options considered

- During an R&V in December 2016, over 20 options were considered costed for up to 100 years.

- Our chosen solution, a mix of RainScape, storage, increased PFF and asset optimization offered the best value solution for DCWW at £16m, whilst aligning with their Customer first principles and 2050 vision.

- A traditional approach, to simply increase storage by 22,500m³, would have cost DCWW £27m. It would also have significantly increased capacity requirements at Llanelli WwTW's by 15%; approximately £3m.

Smart solutions - asset optimisation

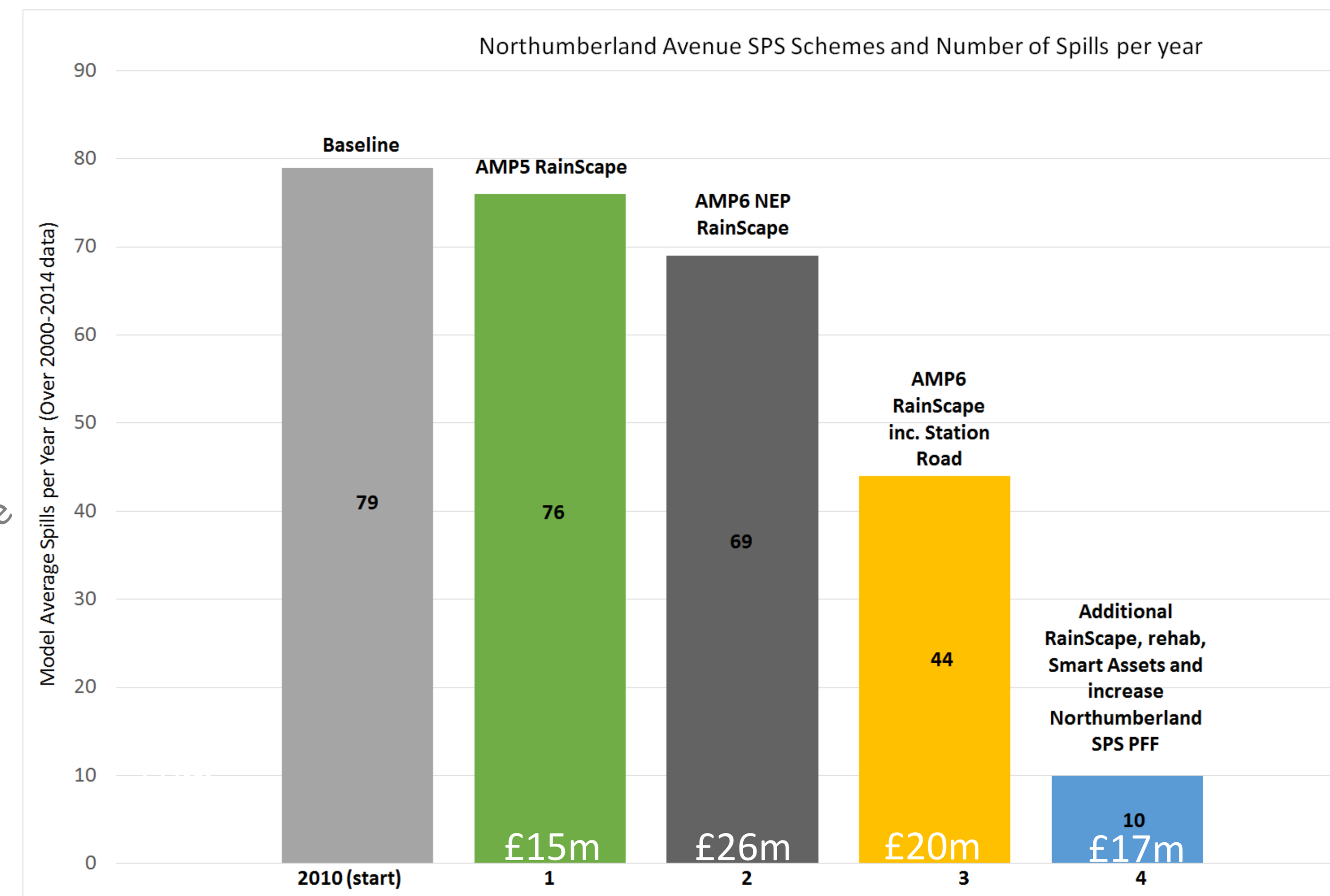
- Llanelli WwTW's is fed by two major inputs; Northumberland SPS (880 l/s) and Bynea SPS (501 l/s).

- If we were to simply increase the inflow from Northumberland to 1,100 l/s, significant hydraulic upgrades would be required at Llanelli WwTW's to cater for the increased flow.

- Our modelling and asset optimisation techniques have allowed us to balance flows between the two assets, as well as other key assets further upstream in the catchment, to ensure the total inflow remains at 1,401 l/s and that all assets are spill compliant.

- This Smart solution has provided an additional saving of £8m

Northumberland Spill Frequency



Project Timeline

- **Mar 2010** spill frequency confirmed / agreed with NRW / WG
- **March 2015** £15m RainScape investment phase 1 complete
- **January 2016** Catchment risk and outline solution agreed - R&V1
- **December 2016** R&V2. Distilled >20 options to preferred 3
- **March 2017** Final stage R&V. Agree best value solution
- **September 2017** NRW sign-off achieved
- **October 2017** GW3 Approved
- **Nov 2017** Procure WPD upgrade - £180k early investment. 2.5ha RainScape works on site
- **March 2018** GW4 Submitted
- **April 2018 - Oct 2018** Start storage tank construction
- **Nov 2018 - Nov 2019** SPS Modifications
- **March 2020** Scheme complete